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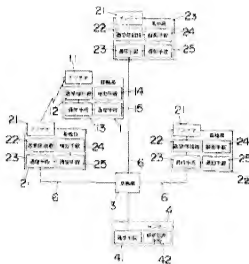
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### (54) INFORMATION GUIDANCE SYSTEM

#### (57)Abstract:

**PROBLEM TO BE SOLVED:** To provide an information guidance system that detects a current position of a mobile station, so as to provide guidance information in response to a current position.

**SOLUTION:** Base stations 21-23 make radio communication with a mobile station 1 in an area. An exchange 3 connects to pluralities of the base stations 21-23 and an information guidance center 4 via a channel 6. A detection means 14(24) is provided to the mobile station 1 (each of the base stations 21-23) and detects an electric field strength or a delay time of a radio wave signal sent/ received between the mobile station 1 and each of the base stations 21-23. A notice



means 15(25) sends a detection result of the detection means 14(24) to the information guide center 4 via the exchange 3. An analysis-processing means 42 in the information guidance center 4 obtains a current position of the mobile station 1, based on the result of detection of the detection means 14, 24 received by a communication means 41 and allows the communication means 41 to send the guidance information, in response to the current position to the mobile station 1.

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## CLAIMS

### [Claim(s)]

[Claim 1]It has a radio communications system which consists of a base station which performs radio between mobile stations, and a switchboard to which a base station was connected, An information guide center which transmits notice information according to a current position of this mobile station to this mobile station by this communication while communicating between mobile stations via a switchboard and a base station is provided, A detection means to detect a signal concerning a position of this mobile station from an electric wave transmitted and received between a mobile station and a base station, While providing in either a reporting means which transmits a detection result of a detection means to an information guide center at least among a mobile station or a base station, An information guide system which forms an analysis processing means to search for position information on this mobile station from a detection result of a detection means transmitted from a reporting means in an information guide center, and is characterized by things.

[Claim 2]The information guide system according to claim 1 with which a detection means which at least three or more base stations were provided, and was formed in a mobile station is characterized by detecting field intensity of an electric wave received from each base station, respectively.

[Claim 3]The information guide system according to claim 1 with which a detection means which at least three or more base stations were provided, and was formed in a base station, respectively is characterized by detecting field intensity of an electric wave received from a mobile station, respectively.

[Claim 4]The information guide system according to claim 1 with which a detection means by which at least three or more base stations were provided, and each base station took a synchronization mutually to a mobile station, had transmitted an electric wave, and was established in a mobile station is characterized by detecting a time delay from a synchronous

state of an electric wave received from each base station, respectively, respectively.

[Claim 5]The information guide system according to claim 1 with which a detection means by which at least three or more base stations were provided, and each base station took a synchronization mutually to a mobile station, had transmitted an electric wave, and was established in a base station, respectively is characterized by detecting a time delay from a synchronous state of an electric wave received from a mobile station, respectively.

[Claim 6]The information guide system according to claim 1 characterized by a detection means detecting field intensity of an electric wave, and azimuth information of this mobile station from an electric wave from a mobile station which provided a directional antenna in a base station and was received with this directional antenna.

[Claim 7]The information guide system according to claim 1 to 6 with which a detection means is characterized by detecting a signal concerning a position to predetermined timing.

[Claim 8]The information guide system according to claim 1 which provides a displaying means which displays position information on a mobile station obtained by an analysis processing means in an information guide center, and is characterized by things.

[Claim 9]The information guide system according to claim 1 which provides an information selecting means which chooses automatically notice information transmitted to this mobile station from notice information set up beforehand in an information guide center based on position information on a mobile station obtained by an analysis processing means, and is characterized by things.

[Claim 10]The information guide system according to claim 1 which provides position information guide mechanism which transmits position information on another mobile station to a certain mobile station as notice information in an information guide center based on position information on two or more mobile stations obtained by an analysis processing means, and is characterized by things.

[Claim 11]The information guide system according to claim 1 which forms the 1st offer-of-information means that carries out call origination of the predetermined mobile station to time set up beforehand, and transmits predetermined notice information to this mobile station in an information guide center, and is characterized by things.

[Claim 12]The information guide system according to claim 1 which will carry out call origination of this mobile station, will form the 2nd offer-of-information means that transmits predetermined notice information in an information guide center if a mobile station comes to a position set up beforehand, and is characterized by things.

[Translation done.]

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## DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention]This invention relates to the information guide system which provides with the notice information according to the user's current position the user who possesses a mobile station using a radio communications system.

[0002]

[Description of the Prior Art]At the hall of indoor [ , such as the show hall, an art gallery, and a theme park, ] or the outdoors, as a method of performing guidance in the hall to a user, conventionally, When it showed around by having installed the information desk and the direction board in the predetermined place or the user came to the predetermined place like a radio guide system, there were some which perform same guidance to all the users. Global positioning systemLike the navigation system using [abbreviating to GPS (Global Positioning System) hereafter], the user's current position was pinpointed from the position information acquired by GPS, and there were some which provide a user with the information registered beforehand. Also in radio communications systems, such as a cellular phone, in order to communicate between a base station and a mobile station, the position information on a mobile station is managed per mail arrival area or base station, and providing with the notice information according to a current position the user who possessed the mobile station using this position information is also considered.

[0003]

[Problem(s) to be Solved by the Invention]In some which are installed in the predetermined place like an information desk or a direction board among the information guide systems mentioned above, in order for a user to receive guidance, first, the user looked for the information desk and the setting position of the direction board, and there was a problem that it had to go to the setting position.

[0004]On the other hand, in a radio guide system, since the user provided many and unspecified users with the notice information beforehand decided to come to a predetermined place, there was a problem that the notice information which the user desires could not necessarily be provided. Since the navigation system using GPS also provided only the notice information registered beforehand, it had the problem that the notice information which the user desires could not necessarily be provided.

[0005]In the thing using a radio communications system. Since to have managed the position information on a mobile station per mail arrival area or base station, and the accuracy of position information became a range which the electric wave of a base station reaches, in order to have pinpointed the user's current position at the halls, such as the show hall, an art gallery, and a theme park, the accuracy of position information was coarse and there was a problem of not being practical.

[0006]Then, although it is also possible to provide from remoteness the notice information which a user desires by a wireless information system based on a user's current position which combined GPS and a radio communications system and was obtained by GPS, In that case, the system provided with both GPS and a radio communications system needed to be built, and there was a problem that a system became expensive.

[0007]In view of the above-mentioned problem, it succeeds in this invention, and the purpose of an invention of Claims 1-12 detects the current position of the user who possesses a mobile station, and there is in providing the information guide system which can provide a user with the notice information according to the current position.

[0008]

[Means for Solving the Problem]A base station which performs radio between mobile stations to achieve the above objects in an invention of Claim 1, An information guide center which transmits notice information according to a current position of this mobile station to this mobile station by this communication while having a radio communications system which consists of a switchboard to which a base station was connected and communicating between mobile stations via a switchboard and a base station is provided, A detection means to detect a signal concerning a position of this mobile station from an electric wave transmitted and received between a mobile station and a base station, While providing in either a reporting means which transmits a detection result of a detection means to an information guide center at least among a mobile station or a base station, Since an analysis processing means to search for position information on this mobile station from a detection result of a detection means transmitted from a reporting means is formed in an information guide center, exact position information on a mobile station can be searched for from a detection result of a detection means provided in a mobile station or a base station. Since only a radio communications system is used, cost of the whole system can be held down compared with a case where GPS and a radio

communications system are combined.

[0009]In an invention of Claim 2, at least three or more base stations are provided in an invention of Claim 1, A detection means formed in a mobile station has detected field intensity of an electric wave received from each base station, respectively, and it in an invention of Claim 3. Since a detection means formed in a base station, respectively has detected field intensity of an electric wave received from a mobile station, respectively, when it finds distance of a mobile station and each base station from field intensity of an electric wave, respectively and narrows down a range in which a mobile station is, position information on a mobile station can be searched for correctly. It can divert without newly adding a special function to a conventional mobile station and a base station, since a mobile station and a base station are provided with a function to detect field intensity of a received electric wave, respectively.

[0010]In an invention of Claim 4, at least three or more base stations were provided, and each base station took a synchronization mutually to a mobile station, and has transmitted an electric wave, From each base station, a detection means formed in a mobile station has detected a time delay from a synchronous state of an electric wave received, respectively, respectively, and it in an invention of Claim 5. Since a detection means formed in a base station, respectively has detected a time delay from a synchronous state of an electric wave received from a mobile station, respectively, when it finds distance of a mobile station and each base station from a time delay of an electric wave, respectively and narrows down a range in which a mobile station is, position information on a mobile station can be searched for correctly. When field intensity of an electric wave is detected, other mobile stations and base stations, Or by interference with other radio communications systems, although a detection error range is not constant, since a detection error range is based on time-measurement accuracy when detecting a time delay, a detection error range serves as approximately regulated, and position information on a mobile station can be searched for with sufficient accuracy.

[0011]From an electric wave from a mobile station which provided a directional antenna in a base station and was received with this directional antenna in an invention of Claim 1 in an invention of Claim 6, since a detection means has detected field intensity of an electric wave, and azimuth information of this mobile station, By finding a direction and distance of a mobile station from this base station, a position of a mobile station can be searched for in one base station.

[0012]In an invention of Claim 7, in an invention of Claims 1-6, since a detection means has detected a signal concerning a position to predetermined timing, A detection means can shorten time which detection of a signal concerning a position takes, and time for a mobile station, a base station, a switchboard, and an information guide center to perform processing of those other than a detecting position of a mobile station can be increased. In an invention of

Claim 8, in an invention of Claim 1, since a displaying means which displays position information on a mobile station obtained by an analysis processing means is provided in an information guide center, the information provider can grasp a current position and the move direction of a mobile station in detail in an information guide center.

[0013] In an invention of Claim 9, in an invention of Claim 1 based on position information on a mobile station obtained by an analysis processing means, Since an information selecting means which chooses automatically notice information transmitted to this mobile station from notice information set up beforehand is provided in an information guide center, notice information according to a current position of a mobile station can be transmitted automatically. In an invention of Claim 10, in an invention of Claim 1 based on position information on two or more mobile stations obtained by an analysis processing means, Since position information guide mechanism which transmits position information on another mobile station to a certain mobile station as notice information is provided in an information guide center, If a mobile station is given to companions, such as a child and an old man, even if companions, such as a child and an old man, get lost, a companion who got lost can be immediately found by receiving a current position of this mobile station.

[0014] Since the 1st offer-of-information means that carries out call origination of the predetermined mobile station to time set up beforehand in an invention of Claim 1 in an invention of Claim 11, and transmits predetermined notice information to this mobile station is formed in an information guide center, A user who possessed a mobile station can be provided with fine notice information based on time and position information. Since the 2nd offer-of-information means that carries out call origination of this mobile station to \*\* which comes to a position to which a mobile station was set beforehand by invention of Claim 12 in an invention of Claim 1, and transmits predetermined notice information is formed in an information guide center, It can warn of a mobile station going into a restricted area, or a mobile station can be led along with a predetermined route.

[0015]

[Embodiment of the Invention] An embodiment of the invention is described with reference to Drawings.

(Embodiment 1) As the information guide system of this embodiment shows to drawing 1, it is a Personal Handyphone System as a radio communications system. It uses [it abbreviates to PHS (Personal Handy-phone System) hereafter], The base station to which, as for 1, a mobile station (PHS cordless handset) and 2<sub>1</sub>-- perform radio between the mobile stations 1 in predetermined area, The switchboard to which, as for 3, two or more base station 2<sub>1</sub>-- was connected via the circuit 6, and 4 show the information guide center which transmits the notice information according to the current position of the mobile station 1 to this mobile station 1



while communicating between the mobile stations 1 via switchboard 3 and base station 2<sub>1</sub>--.

[0016]The mobile station 1 via the antenna 11 The transmission and reception circuit 12 with base station 2<sub>1</sub>-- which transmits and receives a radio wave signal in between, Via the transmission and reception circuit 12, the means of communication 13 with base station 2<sub>1</sub>-- which communicates in between, It comprises the detection means 14 to detect the field intensity of the electric wave received from base station 2<sub>1</sub>--, and the reporting means 15 which transmits the detection result of the detection means 14 to the information guide center 4 via base station 2<sub>1</sub>-- and the switchboard 3.

[0017]While base station 2<sub>1</sub>-- communicates between the mobile stations 1 via the transmission and reception circuit 22 and the transmission and reception circuit 22 which transmit and receive a radio wave signal between the mobile stations 1 via the antenna 21, It comprises the means of communication 23 which communicates between the switchboards 3, the detection means 24 to detect the field intensity of the electric wave received from the mobile station 1, and the reporting means 25 which transmits the detection result of the detection means 24 to the information guide center 4 via the switchboard 3.

[0018]The means of communication 41 in which the information guide center 4 communicates with the mobile station 1 via switchboard 3 and base station 2<sub>1</sub>--, It comprises the analysis processing means 42 to analyze the current position of the mobile station 1 based on the signal concerning the position of the mobile station 1 transmitted from the signal concerning a position of each base station 2<sub>1</sub>-- transmitted from the mobile station 1, or each base station 2<sub>1</sub>--. By the way, when [ of the mobile station 1 and base station 2<sub>1</sub>-- ] communicating in between, the mobile station 1 always looks for the base station of surrounding base station 2<sub>1</sub>-- where the field intensity of inside to a reception radio wave is the strongest, It is communicating between these base stations, the detection means 14 detects the field intensity of the electric wave received from each base station 2<sub>1</sub>--, and the reporting means 15 transmits the detection result of the detection means 14 to the information guide center 4 via base station 2<sub>1</sub>-- and the switchboard 3.

[0019]If the field intensity of the electric wave from this mobile station 1 falls during a telephone call between the mobile stations 1, base station 2<sub>1</sub>--, The field intensity of the electric wave which it directed that carried out hand-over to this mobile station 1 to other base stations, and the detection means 24 received from the mobile station 1 is detected, and the reporting means 25 transmits the detection result of the detection means 24 to the information guide center 4.

[0020] If the output of the electric wave of each base station  $2_1$  -- which the setting position is known beforehand and transmitted from the mobile station 1 and each base station  $2_1$  -- is immobilization, here, The detection means 14 or the detection result of 24 to the mobile station 1 with which the means of communication 41 received the analysis processing means 42 of the information guide center 4 based on the conversion type of the magnitude of attenuation of the field intensity of an electric wave, and travelling distance, and each base station  $2_1$  -- The distance of a between can be found. As a result, can narrow down the range expected that the mobile station 1 is to annular anticipation area  $A_1$  -- made into a center, and each base station  $2_1$  -- the analysis processing means 42, It can be judged as that where the mobile station 1 is in area  $A_4$  with which all the anticipation area  $A_1$  -- laps, and the position information on the mobile station 1 can be searched for correctly. And the information guide center 4 can provide the optimal notice information in a current position based on this position information for every user who possessed the mobile station 1.

[0021] In this embodiment, although anticipation area  $A_1$  -- is approximately annular, anticipation area may serve as ranges other than approximately annular as a result of processing of the analysis processing means 42. At this embodiment, they are the mobile station 1 and base station  $2_1$  -- Although the detection means 14 and 24 are formed in both, they are the mobile station 1 or base station  $2_1$  -- The detection means 14 and 24 may be formed only in either.

[0022] By the way, with PHS, they are the mobile station 1 and base station  $2_1$  -- The digital signal on the electric wave career of a between is divided into the frame for every 5mS, Each frame is divided into eight more slots, and the four remaining slots are assigned for four slots for getting down (base station -> mobile station) going up (mobile station -> base station), respectively. If the mobile station 1 and the information guide center 4 always tend to detect the position information on the mobile station 1 during a telephone call via base station  $2_1$  and the switchboard 3, here, It becomes impossible for other base station  $2_2$  and  $2_3$  to also supervise the electric wave from the mobile station 1, and for base station  $2_2$  and  $2_3$  to communicate with other mobile stations in the meantime. Then, if the position information on this mobile station 1 is detected, only at the time of the call origination of the mobile station 1 all the base station  $2_1$  --, Since what is necessary is just to detect the signal concerning the position of the mobile station 1 by the first control channel (1st slot) at the time of the call origination of the mobile station 1 and one frame has become 5mS in PHS, the time which the detecting position of the mobile station 1 takes can also be managed with 5mS. It seems that it

becomes impossible for base station 2<sub>1</sub>-- to telephone to other mobile stations 1 since a control channel is not used for a telephone call.

[0023] In the information guide system of this invention, since only the radio communications system realizes, the cost which construction of a system takes can be reduced compared with the case where GPS and a radio communications system are used together. In a radio communications system, since it has the function to detect the field intensity of the received electric wave, respectively, mobile station 1 and base station 2<sub>1</sub>-- can be realized, without adding a new function to the present mobile station 1 or base station 2<sub>1</sub>--.

[0024] May perform the detecting position of the mobile station 1 at the time of not the call origination of the mobile station 1 but the receipt to the mobile station 1, and, May carry out, when the mobile station 1 registers a current position on the network of PHS, and may be made to carry out at a fixed interval, and the number of times which detects the position information on the mobile station 1 is lessened, The situation of base station 2<sub>1</sub>-- where a burden is reduced and it becomes impossible for base station 2<sub>1</sub>-- to communicate with other mobile stations 1 is prevented. Mobile station 1 and base station 2<sub>1</sub>-- and the time when the switchboard 3 and the information guide center 4 perform processing of those other than the detecting position of the mobile station 1 can be increased, and each part can be utilized effectively.

[0025] Here, the information guide system of this embodiment is applied to the theme park 5 shown in drawing 10, and the organization which manages the theme park 5 explains the case where various kinds of notice information is provided to the user who entered the theme park 5. First, a user is passed mobile station 1<sub>1</sub>-- when a user enters the theme park 5. When the route to the place to which he wants to go [ user / who possessed mobile station 1<sub>1</sub>-- ] within the theme park 5 is not known, a user does call origination of the specific number to be dialed from mobile station 1<sub>1</sub>-- at the place, The information guide center 4 is called and the route to the place where he wants to go to the information guide center 4 is asked. The analysis processing means 42 makes the transmitting means 41 transmit the route to the place of mobile station 1<sub>1</sub>-- to which a user wants to investigate position information and to go from the place to mobile station 1<sub>1</sub>-- as mentioned above in the information guide center 4 called from mobile station 1<sub>1</sub>--.

[0026] For example, when the user who possessed mobile station 1<sub>3</sub> asks the toilet at the nearest place to the information guide center 4, in the information guide center 4. The user who possessed mobile station 1<sub>3</sub> detects that it is between base station 2<sub>4</sub> and attraction 53<sub>5</sub>,

and the analysis processing means 42 judges the nearest toilet to be toilet 57<sub>5</sub> in the west side of attraction 53<sub>5</sub>, as opposed to the user who transmitted notice information to mobile station 1<sub>3</sub> from the means of communication 41, and possessed this mobile station 1<sub>3</sub> -- for example, - - -- the nearest toilet is 57<sub>5</sub>. If it is from here, it is in the place performed 50 m southwestward. Notice information is provided like ".

[0027] Thus, whether it is where in the theme park 5 or the user who possessed mobile station 1<sub>1</sub> -- does not understand the place in which he is, he can receive the notice information to the place to which he wants to go.

In time, with (Embodiment 2), in radio, such as PHS. Since it cannot communicate normally if the synchronization of the digital signal on the electric wave career of the mobile station 1 and base station 2<sub>1</sub> -- delivered and received in between is not taken, It is necessary to take the synchronization of a digital signal in between, the mobile station 1 is synchronized with the slot of the mobile station 1 and base station 2<sub>1</sub> -- transmitted from base station 2<sub>1</sub>, and it has a function which transmits a signal to base station 2<sub>1</sub>. Therefore, the digital signal sent from each base station 2<sub>1</sub> --, respectively can detect easily which is delayed from a synchronous state. For example, although the detection means 14 of the mobile station 1 has detected the field intensity of the electric wave transmitted from each base station 2<sub>1</sub> -- in Embodiment 1, the detection means 14 has detected the time delay of the digital signal sent from each base station 2<sub>1</sub> -- in this embodiment. And the reporting means 15 transmits the time delay of the signal from each base station 2<sub>1</sub> -- detected by the detection means 14 to the information guide center 4 via base station 2<sub>1</sub> -- and the switchboard 3.

[0028] On the other hand, the base station 2 is provided with the synchronous means 26 for taking a synchronization among other base stations 2, and sending out a digital signal to the mobile station 1 as shown in drawing 3. Although the detection means 24 had detected here the field intensity of the electric wave received from the mobile station 1 by Embodiment 1, According to this embodiment, the digital signal on the electric wave career which received the detection means 24 from the mobile station 1 detects which is delayed from a synchronous state, and the reporting means 25 transmits the detection result of a time delay to the information guide center 4.

[0029] In the information guide center 4, the means of communication 41 receives the detection result of the time delay transmitted from mobile station 1 or base station 2<sub>1</sub> --. Since the propagation rate of the electric wave in the air is constant, the analysis processing means 42 can find the distance from each base station 2<sub>1</sub> -- to the mobile station 1 from the detection

result of a time delay based on the conversion type of the time delay of an electric wave, and travelling distance. As a result, as shown in drawing 4, the analysis processing means 42, The range expected that the mobile station 1 is can be narrowed down to approximately annular anticipation area  $B_1$ -- which makes a center each base station  $2_1$ --, and can be judged to be that whose mobile station 1 is in area  $B_4$  with which all the anticipation area  $B_1$ -- laps, and the position information on the mobile station 1 can be acquired. And the information guide center 4 can provide the optimal notice information in the current position of the user who possessed the mobile station 1 by searching for the position information on the mobile station 1.

[0030]Field intensity to the mobile station 1 and base station  $2_1$  of an electric wave which the detection means 14 and 24 detected in Embodiment 1 -- Although distance is found, The detection error range of the field intensity detected by the detection means 14 and 24 may not become fixed by interference with other mobile stations, a base station, or other radio communications systems etc. On the other hand, since the detection means 14 and 24 have detected the time delay of a digital signal, depend the detection error range of a time delay on time-measurement accuracy and become fixed, compared with the case where field intensity is detected, the current position of the mobile station 1 is detectable in this embodiment, with sufficient accuracy.

[0031]Although anticipation area  $B_1$ -- is approximately annular, anticipation area may serve as ranges other than approximately annular as a result of processing of the analysis processing means 42. Since the composition of information guide systems other than detection means 14 and 24 and synchronous means 26 is the same as that of Embodiment 1, the explanation is omitted.

(Embodiment 3) At Embodiments 1 and 2, they are the mobile station 1 and base station  $2_1$ . -- Although the distance between the mobile station 1 and base station  $2_1$  is found and the position information on the mobile station 1 is searched for from the field intensity of the electric wave of a between, and the time delay of the digital signal, According to this embodiment, as shown in drawing 5, 24 directional antenna 21' which had the directivity of about 15 degrees, respectively is provided in the base station 2, and in the level surface, 24 directional antenna 21' is arranged at intervals of about 15 degrees so that an electric wave can be received over the perimeter within the level surface. and -- detection -- a means -- 24 -- 24 -- a \*\* -- a directional antenna -- 24 -- ' -- inside -- a mobile station -- one -- from -- an electric wave -- most -- it is strong -- field intensity -- having received -- a directional antenna -- 21 -- ' -- this -- a directional antenna -- 21 -- ' -- having received -- an electric wave -- field intensity -- detecting . Since the mobile station 1 is in the direction to which directional antenna 21' which received with the strongest field intensity points, the electric wave from the mobile

station 1 the reporting means 25, The direction to which this directional antenna 21' points with the field intensity of the electric wave which this directional antenna 21' received is transmitted to the means of communication 41 of the information guide center 4 as azimuth information of the mobile station 1.

[0032]Supposing it considers the output of the mobile station 1 as immobilization and the position of the base station 2 is known here, the analysis processing means 42, Based on the conversion type of the magnitude of attenuation of the field intensity of an electric wave, and travelling distance, the distance between the base station 2 and the mobile station 1 can be found from the field intensity of the electric wave from the mobile station 1 which the means of communication 41 received. Since the analysis processing means 42 has received the azimuth information of this mobile station 1, it can search for the position of the mobile station 1 from this azimuth information and the distance from the base station 2 to the mobile station 1.

[0033]For example, although it changes with outputs, setting positions, etc. of the base station 2 in PHS, the range which the electric wave of the base station 2 reaches is about radius 100m as standard. Therefore, if the directivity of directional antenna 21' is made into about 15 degrees, the position of the mobile station 1 is detectable with about a maximum of 26-m error. Since the current position of the mobile station 1 is detectable only in the one base station 2, it is not necessary to install many base stations 2, the whole system can be simplified like Embodiment 1 or 2, and cost required in order to build a system can be reduced.

[0034]Since the composition of those other than base station 2 is the same as that of the information guide system of Embodiment 1, the explanation is omitted.

(Embodiment 4) According to this embodiment, in the information guide system of Embodiment 1, as shown in drawing 6, the displaying means 43 which displays the position information on the mobile station 1 detected by the analysis processing means 42 is formed in the information guide center 4.

[0035]Therefore, even if the situations (a current position, the move direction, etc.) of the mobile station 1 under communication can be easily grasped by the displaying means 43, and the information provider is communicating in the information guide center 4 while this mobile station 1 moves, The mobile station 1 can be provided with still more detailed notice information according to the move direction of the mobile station 1. For example, when the information guide system of this embodiment is applied to the theme park 5 shown in drawing 10, When the user who possessed mobile station 1<sub>2</sub> is moving towards the drawing 10 Nakaya seal C in the west side of institution 54<sub>4</sub>, in the information guide center 4. An information provider judges that the user who possessed mobile station 1<sub>2</sub> from the display of the displaying means 43 is moving in the direction of the arrow C, and is going to the way of attraction 53<sub>3</sub> now [ " ] as opposed to this user. When it furthermore progresses, it is attraction

53<sub>2</sub>. Like ", still more detailed notice information can be provided according to not only the notice information about a user's current position but a user's move direction.

[0036] Since the composition of those other than displaying means 43 is the same as that of Embodiment 1, the explanation is omitted.

(Embodiment 5) In the information guide system of Embodiment 1 at this embodiment, The guidance information database (it abbreviates to the notice information DB hereafter) 45 with which predetermined notice information was beforehand registered as shown in drawing 7, The information selecting means 44 which chooses required notice information from the database 45 automatically based on the position information on the mobile station 1 detected by the analysis processing means 42 is established, The means of communication 41 transmits notice information with the selected information selecting means 44 to the mobile station 1 via switchboard 3 and base station 2<sub>1</sub>--.

[0037] If the predetermined number to be dialed is set up for every contents of notice information, respectively, here, The information selecting means 44 based on the number to be dialed by which call origination was carried out from the mobile station 1, and the position information on the mobile station 1 detected by the analysis processing means 42, Since required notice information is automatically chosen from notice information DB45 and the means of communication 41 transmits this notice information to the mobile station 1 via switchboard 3 and base station 2<sub>1</sub>--, automation of the notice information center 4 can be attained.

[0038] The case where the information guide system of this embodiment is applied to the theme park 5 shown in drawing 10 is explained. Attraction 53<sub>1</sub> in a current position if mobile station 1<sub>1</sub>-- carries out call origination of the 1st number to be dialed here -- Waiting time is guided, Toilet 57<sub>1</sub> which is near the current position if call origination of the 2nd number to be dialed is carried out -- The 1st - the 3rd number to be dialed are set up for every contents of notice information, respectively as the way back (route from a current position to the entrance 51) will be shown, if a place is shown, and call origination of the 3rd number to be dialed is carried out.

[0039] For example, if the user who possessed mobile station 1<sub>3</sub> wants to know the place of a near toilet, a user will do call origination of the 2nd number to be dialed using mobile station 1<sub>3</sub>. At this time, the analysis processing means 42 detects the current position (north side of attraction 53<sub>5</sub>) of mobile station 1<sub>3</sub> as mentioned above in the information guide center 4, The information selecting means 44 chooses the notice information of the nearest toilet from notice information DB45 according to the current position of mobile station 1<sub>3</sub>. The means of

communication 41 can be made to be able to transmit this notice information to the mobile station 1, and notice information can be provided to the mobile station 1 like "being in the place of about 50 m of the directions of southwest, if nearest toilet 57<sub>5</sub> is from here."

[0040] Since the composition of those other than the information selecting means 44 and notice information DB45 is the same as that of the information guide system of Embodiment 1, the explanation is omitted.

(Embodiment 6) According to this embodiment, Embodiment 1 or the information guide system of 4 is provided with the following.

Position information guide mechanism 46 which manages the position information on all the mobile stations 1 detected by the analysis processing means 42 as shown in drawing 8.

The displaying means 43 which displays the position information on all the mobile stations 1 managed by the position information guide mechanism 46.

And when a certain mobile station 1 carries out call origination of the information guide center 4 and the current position of another mobile station 1 is asked, in the information guide center 4. Since the position information guide mechanism 46 has managed the position information on all the mobile stations 1 and the current position of all the mobile stations 1 is displayed on the displaying means 43, The route from the current position of the mobile station 1 which carried out call origination of the information guide center 4, and the current position of another mobile station 1 asked by this mobile station 1 to another mobile station 1 can be made to transmit to the mobile station 1 from the means of communication 41. When there is an inquiry of the current position of the mobile station 1 to another mobile station 1 using the information selecting means 44 mentioned above instead of the displaying means 43, The information selecting means 44 chooses the position information on another mobile station 1 from the position information on all the mobile stations 1 which the position information guide mechanism 46 has managed, and it may be made to make this position information transmit to the mobile station 1 from the means of communication 41.

[0041] The case where the information guide system of this embodiment is applied to the theme park 5 shown in drawing 10 is explained. When parent-and-child companion's user's child becomes a missing child within the theme park 5, supposing parents possess mobile station 1<sub>2</sub> and the child possesses mobile station 1<sub>1</sub>, for example, parents, In order to look for a child, mobile station 1<sub>2</sub> is used, call origination of the information guide center 4 is carried out, and the information guide center 4 is asked about the current position of mobile station 1<sub>1</sub>. In the information guide center 4, the position information guide mechanism 46 is all the mobile station 1<sub>1</sub>. -- The current position is managed and it is all the mobile station 1<sub>1</sub> to the displaying means 43. -- Since the current position is displayed, As opposed to mobile station 1<sub>2</sub> which



parents possess since it turns out easily that mobile station 1<sub>1</sub> which the child possessed is in the north side of institution 54<sub>2</sub>, and mobile station 1<sub>2</sub> which parents possessed is in the west side of institution 54<sub>4</sub>. "mobile station 1<sub>1</sub> is in the north side of institution 54<sub>2</sub>. When it is from here, it is about 100 m at the direction of northwestern. Like ", the current position of other mobile station 1<sub>1</sub> can be provided as notice information.

[0042] Since the composition of those other than displaying means 43 and position information guide mechanism 46 is the same as that of Embodiment 1 or the information guide system of 4, the explanation is omitted.

(Embodiment 7) In the information guide system of Embodiment 1 at this embodiment, As shown in drawing 9, while providing the predetermined notice information which predetermined notice information carried out call origination of the predetermined mobile station 1 to the time beforehand set to notice information DB45 registered beforehand, and chose from notice information DB45 to this mobile station 1, If the mobile station 1 comes to the place set up beforehand, call origination of this mobile station 1 was carried out, and 1st and 2nd offer-of-information means slack offer-of-information means 47 to provide the predetermined notice information chosen from notice information DB45 to this mobile station 1 are formed.

[0043] The case where the information guide system of this embodiment is applied to the theme park 5 shown in drawing 10 is explained. When an information provider wants to show the user who possessed the mobile station 1 to the closing time of a theme park, If the information provider sets beforehand the closing time of the theme park 5, and the contents (route to the closing time and the entrance 51 of the theme park 5) of notice information as the offer-of-information means 47, If the closing time of the theme park 5 comes, the offer-of-information means 47 can carry out call origination of all the mobile stations 1 in the theme park 5 to the means of communication 41, and can make the notice information of the route to the closing time chosen from notice information DB45 to each mobile station 1, and the entrance 51 transmit.

[0044] For example, if the closing time of the theme park 5 draws near, in the information guide center 4, the offer-of-information means 47 will carry out call origination of the mobile station 1<sub>3</sub> to the means of communication 41. Since it turns out that mobile station 1<sub>3</sub> is in the north side of attraction 53<sub>5</sub> as a result of the analysis processing means' 42 detecting the current position of mobile station 1<sub>3</sub> at this time, The offer-of-information means 47 makes the notice information chosen from notice information DB45 transmit to mobile station 1<sub>3</sub> from the means of communication 41, and receive mobile station 1<sub>3</sub>. "it will be closing time soon. The entrances 51 are the direction of southeastern, and about 200 m. While telling closing time like

", the route from a its present location to the entrance 51 can be guided.

[0045]If the fellow users who possessed the mobile station 1 register a meeting time and a meeting place into the offer-of-information means 47 beforehand, If the meeting time comes, the offer-of-information means 47 can carry out call origination of the mobile station 1 beforehand registered into the means of communication 41, and the route from the current position of that a meeting time came and this mobile station 1 detected by the analysis processing means 42 to a meeting place can be made to transmit to this mobile station 1.

[0046]Thus, since predetermined notice information is provided to the mobile station 1 if the time set up beforehand comes, the user who possessed the mobile station 1 can be provided with fine notice information. If the user who possessed the mobile station 1 comes to a predetermined place and the information provider will, on the other hand, set those place and contents of notice information as the offer-of-information means 47 beforehand to provide predetermined notice information to this user, While the offer-of-information means 47 detects having come to the place where this mobile station 1 was set up beforehand from the position of the mobile station 1 detected by the analysis processing means 42 and carries out call origination of this mobile station 1 to the means of communication 41, The predetermined notice information chosen from notice information DB45 to this mobile station 1 can be made to transmit.

[0047]For example, since attraction 53<sub>1</sub> in the theme park 5 is construction, when it is a restricted area, an information provider sets beforehand the notice information that the place of attraction 53<sub>1</sub> and attraction 53<sub>1</sub> are a restricted area as the offer-of-information means 47.

Here, if the user who possessed mobile station 1<sub>4</sub> enters in attraction 53<sub>1</sub> which is a restricted area, the offer-of-information means 47 will detect that mobile station 1<sub>4</sub> is in attraction 53<sub>1</sub> from the current position of mobile station 1<sub>4</sub> detected by the analysis processing means 41. If it carries out, the offer-of-information means 47 will choose from notice information DB45 the notice information set up beforehand, and will transmit to mobile station 1<sub>4</sub> while carrying out call origination of the mobile station 1<sub>4</sub> to the means of communication 41. "attraction 53<sub>1</sub> is under construction now. Since it cannot use, please leave promptly. An accident etc. can be beforehand prevented from providing a user with notice information, demanding cautions from this user, and occurring within an off-limits division like ".

[0048]If the information provider sets notice information, such as an inspection course and a route, as the offer-of-information means 47 when a predetermined inspection course is in the theme park 5, When the mobile station 1 comes to the key point so that the mobile station 1 can inspect along with an inspection course, the offer-of-information means 47, While detecting that the mobile station 1 came to the predetermined place from the current position

of the mobile station 1 detected by the analysis processing means and carrying out call origination of this mobile station 1 to the means of communication 41, notice information, such as a route chosen from notice information DB45, can be made to transmit to this mobile station 1. When the mobile station 1 strays off an inspection course, the offer-of-information means 47 can transmit a right route to this mobile station 1 similarly.

[0049] Thus, since he is trying to provide the notice information registered beforehand if the mobile station 1 comes to a predetermined place, fine notice information can be provided by the user who possessed the mobile station 1. Since the composition of those other than notice information DB45 and offer-of-information means 47 is the same as that of the information guide system of Embodiment 1, the explanation is omitted.

[0050]

[Effect of the Invention] The base station where the invention of Claim 1 performs radio between mobile stations as mentioned above, The information guide center which transmits the notice information according to the current position of this mobile station to this mobile station by this communication while having a radio communications system which consists of a switchboard to which the base station was connected and communicating between mobile stations via a switchboard and a base station is provided, A detection means to detect the signal concerning the position of this mobile station from the electric wave transmitted and received between a mobile station and a base station, While providing in either the reporting means which transmits the detection result of a detection means to an information guide center at least among a mobile station or a base station, Since an analysis processing means to search for the position information on this mobile station from the detection result of the detection means transmitted from the reporting means is formed in the information guide center, The exact position information on a mobile station can be searched for from the detection result of a detection means provided in the mobile station or the base station, and it is effective in the ability to transmit the notice information according to the current position of the mobile station to a mobile station. Since only the radio communications system is used, compared with the case where GPS and a radio communications system are combined, it is effective in the ability to hold down the cost of the whole system. The invention of Claim 2 has detected the field intensity of the electric wave received from each base station, respectively, and the detection means which at least three or more base stations were provided, and was formed in the mobile station the invention of Claim 3, Since the detection means formed in the base station, respectively has detected the field intensity of the electric wave received from the mobile station, respectively, By finding the distance of a mobile station and each base station from the field intensity of an electric wave, respectively, and narrowing down the range in which a mobile station is, the position information on a mobile station can be searched for correctly, and it is effective in the ability to transmit the notice information according to the

current position of the mobile station to a mobile station like the invention of Claim 1. A mobile station and a base station are effective in the ability to divert, without newly adding a special function to a conventional mobile station and base station, since it has the function to detect the field intensity of the received electric wave, respectively.

[0051]At least three or more base stations were provided, each base station took the synchronization mutually to the mobile station, and the invention of Claim 4 has transmitted the electric wave, From each base station, the detection means formed in the mobile station has detected the time delay from the synchronous state of the electric wave received, respectively, respectively, and it the invention of Claim 5, Since the detection means formed in the base station, respectively has detected the time delay from the synchronous state of the electric wave received from the mobile station, respectively, By finding the distance of a mobile station and each base station from the time delay of an electric wave, respectively, and narrowing down the range in which a mobile station is, the position information on a mobile station can be searched for correctly, and it is effective in the ability to transmit the notice information according to the current position of the mobile station to a mobile station like the invention of Claim 1. When the field intensity of an electric wave is detected, other mobile stations and base stations, Or since the detection error range is based on time-measurement accuracy by interference with other radio communications systems when detecting a time delay although the detection error range is not constant, the detection error range serves as approximately regulated, and is effective in the ability to search for the position information on the mobile station 1 with sufficient accuracy.

[0052]From the electric wave from the mobile station which the invention of Claim 6 provided the directional antenna in the base station, and was received with this directional antenna, since the detection means has detected the field intensity of an electric wave, and the azimuth information of this mobile station, By finding the direction and distance of a mobile station from this base station, it is effective in the ability to search for the position of a mobile station in one base station. Since the invention of Claim 7 has detected the signal concerning a position to predetermined timing, a detection means, A detection means can shorten time which detection of the signal concerning a position takes, time for a mobile station, a base station, a switchboard, and an information guide center to perform processing of those other than the detecting position of a mobile station can be increased, and it is effective in each part being effectively utilizable.

[0053]Since the invention of Claim 8 has provided the displaying means which displays the position information on the mobile station obtained by the analysis processing means in the information guide center, The information provider can grasp the current position and the move direction of a mobile station in detail, and is effective in the ability to provide with fine notice information the user who possessed the mobile station in an information guide center. Since

the invention of Claim 9 has provided the information selecting means which chooses automatically the notice information transmitted to this mobile station from the notice information set up beforehand in the information guide center based on the position information on the mobile station obtained by the analysis processing means, The notice information according to the current position of the mobile station can be transmitted automatically, and it is effective in the ability to attain \*\* people-ization of an information guide center.

[0054] Since the invention of Claim 10 has provided the position information guide mechanism which transmits the position information on another mobile station to a certain mobile station as notice information in the information guide center based on the position information on two or more mobile stations obtained by the analysis processing means, If another mobile station is given to companions, such as a child and an old man, even if companions, such as a child and an old man, get lost, it is effective in the ability to find out the companion who got lost immediately by receiving the current position of this mobile station.

[0055] The invention of Claim 11 carries out call origination of the predetermined mobile station to the time set up beforehand, and since the 1st offer-of-information means that transmits predetermined notice information to this mobile station is formed in the information guide center, it is effective in the ability to provide with finer notice information the user who possessed the mobile station from time and position information. Since the invention of Claim 12 has formed the 2nd offer-of-information means that carries out call origination of this mobile station, and transmits predetermined notice information in the information guide center if a mobile station comes to the position set up beforehand, It is effective in the ability to warn of a mobile station going into a restricted area, or lead a mobile station along with a predetermined route.

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TECHNICAL FIELD

[Field of the Invention] This invention relates to the information guide system which provides with the notice information according to the user's current position the user who possesses a mobile station using a radio communications system.

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PRIOR ART

[Description of the Prior Art]At the hall of indoor [, such as the show hall, an art gallery, and a theme park, ] or the outdoors, as a method of performing guidance in the hall to a user, conventionally, When it showed around by having installed the information desk and the direction board in the predetermined place or the user came to the predetermined place like a radio guide system, there were some which perform same guidance to all the users. Global positioning systemLike the navigation system using [abbreviating to GPS (Global Positioning System) hereafter], the user's current position was pinpointed from the position information acquired by GPS, and there were some which provide a user with the information registered beforehand. Also in radio communications systems, such as a cellular phone, in order to communicate between a base station and a mobile station, the position information on a mobile station is managed per mail arrival area or base station, and providing with the notice information according to a current position the user who possessed the mobile station using this position information is also considered.

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## EFFECT OF THE INVENTION

[Effect of the Invention]The base station where the invention of Claim 1 performs radio between mobile stations as mentioned above, The information guide center which transmits the notice information according to the current position of this mobile station to this mobile station by this communication while having a radio communications system which consists of a switchboard to which the base station was connected and communicating between mobile stations via a switchboard and a base station is provided, A detection means to detect the signal concerning the position of this mobile station from the electric wave transmitted and received between a mobile station and a base station, While providing in either the reporting means which transmits the detection result of a detection means to an information guide center at least among a mobile station or a base station, Since an analysis processing means to search for the position information on this mobile station from the detection result of the detection means transmitted from the reporting means is formed in the information guide center, The exact position information on a mobile station can be searched for from the detection result of a detection means provided in the mobile station or the base station, and it is effective in the ability to transmit the notice information according to the current position of the mobile station to a mobile station. Since only the radio communications system is used, compared with the case where GPS and a radio communications system are combined, it is effective in the ability to hold down the cost of the whole system. The invention of Claim 2 has detected the field intensity of the electric wave received from each base station, respectively, and the detection means which at least three or more base stations were provided, and was formed in the mobile station the invention of Claim 3, Since the detection means formed in the base station, respectively has detected the field intensity of the electric wave received from the mobile station, respectively, By finding the distance of a mobile station and each base station from the field intensity of an electric wave, respectively, and narrowing down the range in which a mobile station is, the position information on a mobile station can be searched for



correctly, and it is effective in the ability to transmit the notice information according to the current position of the mobile station to a mobile station like the invention of Claim 1. A mobile station and a base station are effective in the ability to divert, without newly adding a special function to a conventional mobile station and base station, since it has the function to detect the field intensity of the received electric wave, respectively.

[0051]At least three or more base stations were provided, each base station took the synchronization mutually to the mobile station, and the invention of Claim 4 has transmitted the electric wave, From each base station, the detection means formed in the mobile station has detected the time delay from the synchronous state of the electric wave received, respectively, and it the invention of Claim 5, Since the detection means formed in the base station, respectively has detected the time delay from the synchronous state of the electric wave received from the mobile station, respectively, By finding the distance of a mobile station and each base station from the time delay of an electric wave, respectively, and narrowing down the range in which a mobile station is, the position information on a mobile station can be searched for correctly, and it is effective in the ability to transmit the notice information according to the current position of the mobile station to a mobile station like the invention of Claim 1. When the field intensity of an electric wave is detected, other mobile stations and base stations, Or since the detection error range is based on time-measurement accuracy by interference with other radio communications systems when detecting a time delay although the detection error range is not constant, the detection error range serves as approximately regulated, and is effective in the ability to search for the position information on the mobile station 1 with sufficient accuracy.

[0052]From the electric wave from the mobile station which the invention of Claim 6 provided the directional antenna in the base station, and was received with this directional antenna, since the detection means has detected the field intensity of an electric wave, and the azimuth information of this mobile station, By finding the direction and distance of a mobile station from this base station, it is effective in the ability to search for the position of a mobile station in one base station. Since the invention of Claim 7 has detected the signal concerning a position to predetermined timing, a detection means, A detection means can shorten time which detection of the signal concerning a position takes, time for a mobile station, a base station, a switchboard, and an information guide center to perform processing of those other than the detecting position of a mobile station can be increased, and it is effective in each part being effectively utilizable.

[0053]Since the invention of Claim 8 has provided the displaying means which displays the position information on the mobile station obtained by the analysis processing means in the information guide center, The information provider can grasp the current position and the move direction of a mobile station in detail, and is effective in the ability to provide with fine notice

information the user who possessed the mobile station in an information guide center. Since the invention of Claim 9 has provided the information selecting means which chooses automatically the notice information transmitted to this mobile station from the notice information set up beforehand in the information guide center based on the position information on the mobile station obtained by the analysis processing means, The notice information according to the current position of the mobile station can be transmitted automatically, and it is effective in the ability to attain \*\* people-ization of an information guide center.

[0054] Since the invention of Claim 10 has provided the position information guide mechanism which transmits the position information on another mobile station to a certain mobile station as notice information in the information guide center based on the position information on two or more mobile stations obtained by the analysis processing means, If another mobile station is given to companions, such as a child and an old man, even if companions, such as a child and an old man, get lost, it is effective in the ability to find out the companion who got lost immediately by receiving the current position of this mobile station.

[0055] The invention of Claim 11 carries out call origination of the predetermined mobile station to the time set up beforehand, and since the 1st offer-of-information means that transmits predetermined notice information to this mobile station is formed in the information guide center, it is effective in the ability to provide with finer notice information the user who possessed the mobile station from time and position information. Since the invention of Claim 12 has formed the 2nd offer-of-information means that carries out call origination of this mobile station, and transmits predetermined notice information in the information guide center if a mobile station comes to the position set up beforehand, It is effective in the ability to warn of a mobile station going into a restricted area, or lead a mobile station along with a predetermined route.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention]In some which are installed in the predetermined place like an information desk or a direction board among the information guide systems mentioned above, in order for a user to receive guidance, first, the user looked for the information desk and the setting position of the direction board, and there was a problem that it had to go to the setting position.

[0004]On the other hand, in a radio guide system, since the user provided many and unspecified users with the notice information beforehand decided to come to a predetermined place, there was a problem that the notice information which the user desires could not necessarily be provided. Since the navigation system using GPS also provided only the notice information registered beforehand, it had the problem that the notice information which the user desires could not necessarily be provided.

[0005]In the thing using a radio communications system.Since to have managed the position information on a mobile station per mail arrival area or base station, and the accuracy of position information became a range which the electric wave of a base station reaches, in order to have pinpointed the user's current position at the halls, such as the show hall, an art gallery, and a theme park, the accuracy of position information was coarse and there was a problem of not being practical.

[0006]Then, although it is also possible to provide from remoteness the notice information which a user desires by a wireless information system based on a user's current position which combined GPS and a radio communications system and was obtained by GPS, In that case, the system provided with both GPS and a radio communications system needed to be built, and there was a problem that a system became expensive.

[0007]In view of the above-mentioned problem, it succeeds in this invention, and the purpose of an invention of Claims 1-12 detects the current position of the user who possesses a mobile station, and there is in providing the information guide system which can provide a user with

the notice information according to the current position.

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MEANS

[Means for Solving the Problem]A base station which performs radio between mobile stations to achieve the above objects in an invention of Claim 1, An information guide center which transmits notice information according to a current position of this mobile station to this mobile station by this communication while having a radio communications system which consists of a switchboard to which a base station was connected and communicating between mobile stations via a switchboard and a base station is provided, A detection means to detect a signal concerning a position of this mobile station from an electric wave transmitted and received between a mobile station and a base station, While providing in either a reporting means which transmits a detection result of a detection means to an information guide center at least among a mobile station or a base station, Since an analysis processing means to search for position information on this mobile station from a detection result of a detection means transmitted from a reporting means is formed in an information guide center, exact position information on a mobile station can be searched for from a detection result of a detection means provided in a mobile station or a base station. Since only a radio communications system is used, cost of the whole system can be held down compared with a case where GPS and a radio communications system are combined.

[0009]In an invention of Claim 2, at least three or more base stations are provided in an invention of Claim 1, A detection means formed in a mobile station has detected field intensity of an electric wave received from each base station, respectively, and it in an invention of Claim 3. Since a detection means formed in a base station, respectively has detected field intensity of an electric wave received from a mobile station, respectively, when it finds distance of a mobile station and each base station from field intensity of an electric wave, respectively and narrows down a range in which a mobile station is, position information on a mobile station can be searched for correctly. It can divert without newly adding a special function to a conventional mobile station and a base station, since a mobile station and a base station are

provided with a function to detect field intensity of a received electric wave, respectively.

[0010]In an invention of Claim 4, at least three or more base stations were provided, and each base station took a synchronization mutually to a mobile station, and has transmitted an electric wave, From each base station, a detection means formed in a mobile station has detected a time delay from a synchronous state of an electric wave received, respectively, respectively, and it in an invention of Claim 5. Since a detection means formed in a base station, respectively has detected a time delay from a synchronous state of an electric wave received from a mobile station, respectively, when it finds distance of a mobile station and each base station from a time delay of an electric wave, respectively and narrows down a range in which a mobile station is, position information on a mobile station can be searched for correctly. When field intensity of an electric wave is detected, other mobile stations and base stations, Or by interference with other radio communications systems, although a detection error range is not constant, since a detection error range is based on time-measurement accuracy when detecting a time delay, a detection error range serves as approximately regulated, and position information on a mobile station can be searched for with sufficient accuracy.

[0011]From an electric wave from a mobile station which provided a directional antenna in a base station and was received with this directional antenna in an invention of Claim 1 in an invention of Claim 6, since a detection means has detected field intensity of an electric wave, and azimuth information of this mobile station, By finding a direction and distance of a mobile station from this base station, a position of a mobile station can be searched for in one base station.

[0012]In an invention of Claim 7, in an invention of Claims 1-6, since a detection means has detected a signal concerning a position to predetermined timing, A detection means can shorten time which detection of a signal concerning a position takes, and time for a mobile station, a base station, a switchboard, and an information guide center to perform processing of those other than a detecting position of a mobile station can be increased. In an invention of Claim 8, in an invention of Claim 1, since a displaying means which displays position information on a mobile station obtained by an analysis processing means is provided in an information guide center, the information provider can grasp a current position and the move direction of a mobile station in detail in an information guide center.

[0013]In an invention of Claim 9, in an invention of Claim 1 based on position information on a mobile station obtained by an analysis processing means, Since an information selecting means which chooses automatically notice information transmitted to this mobile station from notice information set up beforehand is provided in an information guide center, notice information according to a current position of a mobile station can be transmitted automatically. In an invention of Claim 10, in an invention of Claim 1 based on position information on two or

more mobile stations obtained by an analysis processing means, Since position information guide mechanism which transmits position information on another mobile station to a certain mobile station as notice information is provided in an information guide center, If a mobile station is given to companions, such as a child and an old man, even if companions, such as a child and an old man, get lost, a companion who got lost can be immediately found by receiving a current position of this mobile station.

[0014]Since the 1st offer-of-information means that carries out call origination of the predetermined mobile station to time set up beforehand in an invention of Claim 1 in an invention of Claim 11, and transmits predetermined notice information to this mobile station is formed in an information guide center, A user who possessed a mobile station can be provided with fine notice information based on time and position information. Since the 2nd offer-of-information means that carries out call origination of this mobile station to \*\* which comes to a position to which a mobile station was set beforehand by invention of Claim 12 in an invention of Claim 1, and transmits predetermined notice information is formed in an information guide center, It can warn of a mobile station going into a restricted area, or a mobile station can be led along with a predetermined route.

[0015]

[Embodiment of the Invention]An embodiment of the invention is described with reference to Drawings.

(Embodiment 1) As the information guide system of this embodiment shows to drawing 1, it is a Personal Handyphone System as a radio communications system. It uses [it abbreviates to PHS (Personal Handy-phone System) hereafter], The base station to which, as for 1, a mobile station (PHS cordless handset) and 2<sub>1</sub>-- perform radio between the mobile stations 1 in predetermined area, The switchboard to which, as for 3, two or more base station 2<sub>1</sub>-- was connected via the circuit 6, and 4 show the information guide center which transmits the notice information according to the current position of the mobile station 1 to this mobile station 1 while communicating between the mobile stations 1 via switchboard 3 and base station 2<sub>1</sub>--.

[0016]The mobile station 1 via the antenna 11 The transmission and reception circuit 12 with base station 2<sub>1</sub>-- which transmits and receives a radio wave signal in between, Via the transmission and reception circuit 12, the means of communication 13 with base station 2<sub>1</sub>-- which communicates in between, It comprises the detection means 14 to detect the field intensity of the electric wave received from base station 2<sub>1</sub>--, and the reporting means 15 which transmits the detection result of the detection means 14 to the information guide center 4 via base station 2<sub>1</sub>-- and the switchboard 3.

[0017]While base station 2<sub>1</sub>-- communicates between the mobile stations 1 via the

transmission and reception circuit 22 and the transmission and reception circuit 22 which transmit and receive a radio wave signal between the mobile stations 1 via the antenna 21, It comprises the means of communication 23 which communicates between the switchboards 3, the detection means 24 to detect the field intensity of the electric wave received from the mobile station 1, and the reporting means 25 which transmits the detection result of the detection means 24 to the information guide center 4 via the switchboard 3.

[0018]The means of communication 41 in which the information guide center 4 communicates with the mobile station 1 via switchboard 3 and base station 2<sub>1</sub>--, It comprises the analysis

processing means 42 to analyze the current position of the mobile station 1 based on the signal concerning the position of the mobile station 1 transmitted from the signal concerning a position of each base station 2<sub>1</sub>-- transmitted from the mobile station 1, or each base station

2<sub>1</sub>--. By the way, when [ of the mobile station 1 and base station 2<sub>1</sub>-- ] communicating in between, the mobile station 1 always looks for the base station of surrounding base station 2<sub>1</sub>-

- where the field intensity of inside to a reception radio wave is the strongest, It is communicating between these base stations, the detection means 14 detects the field intensity of the electric wave received from each base station 2<sub>1</sub>--, and the reporting means 15

transmits the detection result of the detection means 14 to the information guide center 4 via base station 2<sub>1</sub>-- and the switchboard 3.

[0019]If the field intensity of the electric wave from this mobile station 1 falls during a telephone call between the mobile stations 1, base station 2<sub>1</sub>--, The field intensity of the electric wave which it directed that carried out hand-over to this mobile station 1 to other base stations, and the detection means 24 received from the mobile station 1 is detected, and the reporting means 25 transmits the detection result of the detection means 24 to the information guide center 4.

[0020]If the output of the electric wave of each base station 2<sub>1</sub>-- which the setting position is known beforehand and transmitted from the mobile station 1 and each base station 2<sub>1</sub>-- is immobilization, here, The detection means 14 or the detection result of 24 to the mobile station 1 with which the means of communication 41 received the analysis processing means 42 of the information guide center 4 based on the conversion type of the magnitude of attenuation of the field intensity of an electric wave, and travelling distance, and each base station 2<sub>1</sub>-- The distance of a between can be found. As a result, can narrow down the range expected that the mobile station 1 is to annular anticipation area A<sub>1</sub>-- made into a center, and each base station 2<sub>1</sub>-- the analysis processing means 42, It can be judged as that where the mobile station 1 is in



area  $A_4$  with which all the anticipation area  $A_1$ -- laps, and the position information on the mobile station 1 can be searched for correctly. And the information guide center 4 can provide the optimal notice information in a current position based on this position information for every user who possessed the mobile station 1.

[0021]In this embodiment, although anticipation area  $A_1$ -- is approximately annular, anticipation area may serve as ranges other than approximately annular as a result of processing of the analysis processing means 42. At this embodiment, they are the mobile station 1 and base station  $2_1$ . -- Although the detection means 14 and 24 are formed in both, they are the mobile station 1 or base station  $2_1$ . -- The detection means 14 and 24 may be formed only in either.

[0022]By the way, with PHS, they are the mobile station 1 and base station  $2_1$ . -- The digital signal on the electric wave career of a between is divided into the frame for every 5mS. Each frame is divided into eight more slots, and the four remaining slots are assigned for four slots for getting down (base station -> mobile station) going up (mobile station -> base station), respectively. If the mobile station 1 and the information guide center 4 always tend to detect the position information on the mobile station 1 during a telephone call via base station  $2_1$  and the switchboard 3, here, It becomes impossible for other base station  $2_2$  and  $2_3$  to also supervise the electric wave from the mobile station 1, and for base station  $2_2$  and  $2_3$  to communicate with other mobile stations in the meantime. Then, if the position information on this mobile station 1 is detected, only at the time of the call origination of the mobile station 1 all the base station  $2_1$ --. Since what is necessary is just to detect the signal concerning the position of the mobile station 1 by the first control channel (1st slot) at the time of the call origination of the mobile station 1 and one frame has become 5mS in PHS, the time which the detecting position of the mobile station 1 takes can also be managed with 5mS. It seems that it becomes impossible for base station  $2_1$ -- to telephone to other mobile stations 1 since a control channel is not used for a telephone call.

[0023]In the information guide system of this invention, since only the radio communications system realizes, the cost which construction of a system takes can be reduced compared with the case where GPS and a radio communications system are used together. In a radio communications system, since it has the function to detect the field intensity of the received electric wave, respectively, mobile station 1 and base station  $2_1$ -- can be realized, without adding a new function to the present mobile station 1 or base station  $2_1$ --.

[0024]May perform the detecting position of the mobile station 1 at the time of not the call origination of the mobile station 1 but the receipt to the mobile station 1, and, May carry out,

when the mobile station 1 registers a current position on the network of PHS, and may be made to carry out at a fixed interval, and the number of times which detects the position information on the mobile station 1 is lessened, The situation of base station 2<sub>1</sub>-- where a burden is reduced and it becomes impossible for base station 2<sub>1</sub>-- to communicate with other mobile stations 1 is prevented. Mobile station 1 and base station 2<sub>1</sub>-- and the time when the switchboard 3 and the information guide center 4 perform processing of those other than the detecting position of the mobile station 1 can be increased, and each part can be utilized effectively.

[0025]Here, the information guide system of this embodiment is applied to the theme park 5 shown in drawing 10, and the organization which manages the theme park 5 explains the case where various kinds of notice information is provided to the user who entered the theme park 5. First, a user is passed mobile station 1<sub>1</sub>-- when a user enters the theme park 5. When the route to the place to which he wants to go [ user / who possessed mobile station 1<sub>1</sub>-- ] within the theme park 5 is not known, a user does call origination of the specific number to be dialed from mobile station 1<sub>1</sub>-- at the place, The information guide center 4 is called and the route to the place where he wants to go to the information guide center 4 is asked. The analysis processing means 42 makes the transmitting means 41 transmit the route to the place of mobile station 1<sub>1</sub>-- to which a user wants to investigate position information and to go from the place to mobile station 1<sub>1</sub>-- as mentioned above in the information guide center 4 called from mobile station 1<sub>1</sub>--.

[0026]For example, when the user who possessed mobile station 1<sub>3</sub> asks the toilet at the nearest place to the information guide center 4, in the information guide center 4. The user who possessed mobile station 1<sub>3</sub> detects that it is between base station 2<sub>4</sub> and attraction 53<sub>5</sub>, and the analysis processing means 42 judges the nearest toilet to be toilet 57<sub>5</sub> in the west side of attraction 53<sub>5</sub>, as opposed to the user who transmitted notice information to mobile station 1<sub>3</sub> from the means of communication 41, and possessed this mobile station 1<sub>3</sub> -- for example, - "-- the nearest toilet is 57<sub>5</sub>. If it is from here, it is in the place performed 50 m southwestward. Notice information is provided like ".

[0027]Thus, whether it is where in the theme park 5 or the user who possessed mobile station 1<sub>1</sub>-- does not understand the place in which he is, he can receive the notice information to the place to which he wants to go.

In time, with (Embodiment 2), in radio, such as PHS. Since it cannot communicate normally if

the synchronization of the digital signal on the electric wave career of the mobile station 1 and base station 2<sub>1</sub>-- delivered and received in between is not taken, It is necessary to take the synchronization of a digital signal in between, the mobile station 1 is synchronized with the slot of the mobile station 1 and base station 2<sub>1</sub>-- transmitted from base station 2<sub>1</sub>, and it has a function which transmits a signal to base station 2<sub>1</sub>. Therefore, the digital signal sent from each base station 2<sub>1</sub>--, respectively can detect easily which is delayed from a synchronous state. For example, although the detection means 14 of the mobile station 1 has detected the field intensity of the electric wave transmitted from each base station 2<sub>1</sub>-- in Embodiment 1, the detection means 14 has detected the time delay of the digital signal sent from each base station 2<sub>1</sub>-- in this embodiment. And the reporting means 15 transmits the time delay of the signal from each base station 2<sub>1</sub>-- detected by the detection means 14 to the information guide center 4 via base station 2<sub>1</sub>-- and the switchboard 3.

[0028]On the other hand, the base station 2 is provided with the synchronous means 26 for taking a synchronization among other base stations 2, and sending out a digital signal to the mobile station 1 as shown in drawing 3. Although the detection means 24 had detected here the field intensity of the electric wave received from the mobile station 1 by Embodiment 1, According to this embodiment, the digital signal on the electric wave career which received the detection means 24 from the mobile station 1 detects which is delayed from a synchronous state, and the reporting means 25 transmits the detection result of a time delay to the information guide center 4.

[0029]In the information guide center 4, the means of communication 41 receives the detection result of the time delay transmitted from mobile station 1 or base station 2<sub>1</sub>--. Since the propagation rate of the electric wave in the air is constant, the analysis processing means 42 can find the distance from each base station 2<sub>1</sub>-- to the mobile station 1 from the detection result of a time delay based on the conversion type of the time delay of an electric wave, and travelling distance. As a result, as shown in drawing 4, the analysis processing means 42, The range expected that the mobile station 1 is can be narrowed down to approximately annular anticipation area B<sub>1</sub>-- which makes a center each base station 2<sub>1</sub>--, and can be judged to be that whose mobile station 1 is in area B<sub>4</sub> with which all the anticipation area B<sub>1</sub>-- laps, and the position information on the mobile station 1 can be acquired. And the information guide center 4 can provide the optimal notice information in the current position of the user who possessed the mobile station 1 by searching for the position information on the mobile station 1.

[0030]Field intensity to the mobile station 1 and base station 2<sub>1</sub> of an electric wave which the

detection means 14 and 24 detected in Embodiment 1 -- Although distance is found, The detection error range of the field intensity detected by the detection means 14 and 24 may not become fixed by interference with other mobile stations, a base station, or other radio communications systems etc. On the other hand, since the detection means 14 and 24 have detected the time delay of a digital signal, depend the detection error range of a time delay on time-measurement accuracy and become fixed, compared with the case where field intensity is detected, the current position of the mobile station 1 is detectable in this embodiment, with sufficient accuracy.

[0031]Although anticipation area  $B_1$  is approximately annular, anticipation area may serve as ranges other than approximately annular as a result of processing of the analysis processing means 42. Since the composition of information guide systems other than detection means 14 and 24 and synchronous means 26 is the same as that of Embodiment 1, the explanation is omitted.

(Embodiment 3) At Embodiments 1 and 2, they are the mobile station 1 and base station  $2_1$ . -- Although the distance between the mobile station 1 and base station  $2_1$  is found and the

position information on the mobile station 1 is searched for from the field intensity of the electric wave of a between, and the time delay of the digital signal, According to this embodiment, as shown in drawing 5, 24 directional antenna 21' which had the directivity of about 15 degrees, respectively is provided in the base station 2, and in the level surface, 24 directional antenna 21' is arranged at intervals of about 15 degrees so that an electric wave can be received over the perimeter within the level surface. and -- detection -- a means -- 24 -- 24 -- a \*\* -- a directional antenna -- 24 -- ' -- inside -- a mobile station -- one -- from -- an electric wave -- most -- it is strong -- field intensity -- having received -- a directional antenna -- 21 -- ' -- this -- a directional antenna -- 21 -- ' -- having received -- an electric wave -- field intensity -- detecting . Since the mobile station 1 is in the direction to which directional antenna 21' which received with the strongest field intensity points, the electric wave from the mobile station 1 the reporting means 25, The direction to which this directional antenna 21' points with the field intensity of the electric wave which this directional antenna 21' received is transmitted to the means of communication 41 of the information guide center 4 as azimuth information of the mobile station 1.

[0032]Supposing it considers the output of the mobile station 1 as immobilization and the position of the base station 2 is known here, the analysis processing means 42, Based on the conversion type of the magnitude of attenuation of the field intensity of an electric wave, and travelling distance, the distance between the base station 2 and the mobile station 1 can be found from the field intensity of the electric wave from the mobile station 1 which the means of communication 41 received. Since the analysis processing means 42 has received the azimuth

information of this mobile station 1, it can search for the position of the mobile station 1 from this azimuth information and the distance from the base station 2 to the mobile station 1.

[0033]For example, although it changes with outputs, setting positions, etc. of the base station 2 in PHS, the range which the electric wave of the base station 2 reaches is about radius 100m as standard. Therefore, if the directivity of directional antenna 21' is made into about 15 degrees, the position of the mobile station 1 is detectable with about a maximum of 26-m error. Since the current position of the mobile station 1 is detectable only in the one base station 2, it is not necessary to install many base stations 2, the whole system can be simplified like Embodiment 1 or 2, and cost required in order to build a system can be reduced.

[0034]Since the composition of those other than base station 2 is the same as that of the information guide system of Embodiment 1, the explanation is omitted.

(Embodiment 4) According to this embodiment, in the information guide system of Embodiment 1, as shown in drawing 6, the displaying means 43 which displays the position information on the mobile station 1 detected by the analysis processing means 42 is formed in the information guide center 4.

[0035]Therefore, even if the situations (a current position, the move direction, etc.) of the mobile station 1 under communication can be easily grasped by the displaying means 43, and the information provider is communicating in the information guide center 4 while this mobile station 1 moves, The mobile station 1 can be provided with still more detailed notice information according to the move direction of the mobile station 1. For example, when the information guide system of this embodiment is applied to the theme park 5 shown in drawing 10, When the user who possessed mobile station 1<sub>2</sub> is moving towards the drawing 10 Nakaya seal C in the west side of institution 54<sub>4</sub>, in the information guide center 4. An information provider judges that the user who possessed mobile station 1<sub>2</sub> from the display of the displaying means 43 is moving in the direction of the arrow C, and is going to the way of attraction 53<sub>3</sub> now [ " ] as opposed to this user. When it furthermore progresses, it is attraction 53<sub>2</sub>. Like " , still more detailed notice information can be provided according to not only the notice information about a user's current position but a user's move direction.

[0036]Since the composition of those other than displaying means 43 is the same as that of Embodiment 1, the explanation is omitted.

(Embodiment 5) In the information guide system of Embodiment 1 at this embodiment, The guidance information database (it abbreviates to the notice information DB hereafter) 45 with which predetermined notice information was beforehand registered as shown in drawing 7, The information selecting means 44 which chooses required notice information from the database 45 automatically based on the position information on the mobile station 1 detected by the analysis processing means 42 is established, The means of communication 41

transmits notice information with the selected information selecting means 44 to the mobile station 1 via switchboard 3 and base station 2<sub>1</sub>--.

[0037]If the predetermined number to be dialed is set up for every contents of notice information, respectively, here, The information selecting means 44 based on the number to be dialed by which call origination was carried out from the mobile station 1, and the position information on the mobile station 1 detected by the analysis processing means 42, Since required notice information is automatically chosen from notice information DB45 and the means of communication 41 transmits this notice information to the mobile station 1 via switchboard 3 and base station 2<sub>1</sub>--, automation of the notice information center 4 can be attained.

[0038]The case where the information guide system of this embodiment is applied to the theme park 5 shown in drawing 10 is explained. Attraction 53<sub>1</sub> in a current position if mobile station 1<sub>1</sub>-- carries out call origination of the 1st number to be dialed here -- Waiting time is guided, Toilet 57<sub>1</sub> which is near the current position if call origination of the 2nd number to be dialed is carried out -- The 1st - the 3rd number to be dialed are set up for every contents of notice information, respectively as the way back (route from a current position to the entrance 51) will be shown, if a place is shown, and call origination of the 3rd number to be dialed is carried out.

[0039]For example, if the user who possessed mobile station 1<sub>3</sub> wants to know the place of a near toilet, a user will do call origination of the 2nd number to be dialed using mobile station 1<sub>3</sub>. At this time, the analysis processing means 42 detects the current position (north side of attraction 53<sub>5</sub>) of mobile station 1<sub>3</sub> as mentioned above in the information guide center 4, The information selecting means 44 chooses the notice information of the nearest toilet from notice information DB45 according to the current position of mobile station 1<sub>3</sub>. The means of communication 41 can be made to be able to transmit this notice information to the mobile station 1, and notice information can be provided to the mobile station 1 like "being in the place of about 50 m of the directions of southwest, if nearest toilet 57<sub>5</sub> is from here."

[0040]Since the composition of those other than the information selecting means 44 and notice information DB45 is the same as that of the information guide system of Embodiment 1, the explanation is omitted.

(Embodiment 6) According to this embodiment, Embodiment 1 or the information guide system of 4 is provided with the following.

Position information guide mechanism 46 which manages the position information on all the mobile stations 1 detected by the analysis processing means 42 as shown in drawing 8.

The displaying means 43 which displays the position information on all the mobile stations 1 managed by the position information guide mechanism 46.

And when a certain mobile station 1 carries out call origination of the information guide center 4 and the current position of another mobile station 1 is asked, in the information guide center 4. Since the position information guide mechanism 46 has managed the position information on all the mobile stations 1 and the current position of all the mobile stations 1 is displayed on the displaying means 43, The route from the current position of the mobile station 1 which carried out call origination of the information guide center 4, and the current position of another mobile station 1 asked by this mobile station 1 to another mobile station 1 can be made to transmit to the mobile station 1 from the means of communication 41. When there is an inquiry of the current position of the mobile station 1 to another mobile station 1 using the information selecting means 44 mentioned above instead of the displaying means 43, The information selecting means 44 chooses the position information on another mobile station 1 from the position information on all the mobile stations 1 which the position information guide mechanism 46 has managed, and it may be made to make this position information transmit to the mobile station 1 from the means of communication 41.

[0041]The case where the information guide system of this embodiment is applied to the theme park 5 shown in drawing 10 is explained. When parent-and-child companion's user's child becomes a missing child within the theme park 5, supposing parents possess mobile station 1<sub>2</sub> and the child possesses mobile station 1<sub>1</sub>, for example, parents, In order to look for a child, mobile station 1<sub>2</sub> is used, call origination of the information guide center 4 is carried out, and the information guide center 4 is asked about the current position of mobile station 1<sub>1</sub>. In the information guide center 4, the position information guide mechanism 46 is all the mobile station 1<sub>1</sub>. -- The current position is managed and it is all the mobile station 1<sub>1</sub> to the displaying means 43. -- Since the current position is displayed, As opposed to mobile station 1<sub>2</sub> which parents possess since it turns out easily that mobile station 1<sub>1</sub> which the child possessed is in the north side of institution 54<sub>2</sub>, and mobile station 1<sub>2</sub> which parents possessed is in the west side of institution 54<sub>4</sub>, "mobile station 1<sub>1</sub> is in the north side of institution 54<sub>2</sub>. When it is from here, it is about 100 m at the direction of northwestern. Like ", the current position of other mobile station 1<sub>1</sub> can be provided as notice information.

[0042]Since the composition of those other than displaying means 43 and position information guide mechanism 46 is the same as that of Embodiment 1 or the information guide system of 4, the explanation is omitted.

(Embodiment 7) In the information guide system of Embodiment 1 at this embodiment, As

shown in drawing 9, while providing the predetermined notice information which predetermined notice information carried out call origination of the predetermined mobile station 1 to the time beforehand set to notice information DB45 registered beforehand, and chose from notice information DB45 to this mobile station 1, If the mobile station 1 comes to the place set up beforehand, call origination of this mobile station 1 was carried out, and 1st and 2nd offer-of-information means slack offer-of-information means 47 to provide the predetermined notice information chosen from notice information DB45 to this mobile station 1 are formed.

[0043]The case where the information guide system of this embodiment is applied to the theme park 5 shown in drawing 10 is explained. When an information provider wants to show the user who possessed the mobile station 1 to the closing time of a theme park, If the information provider sets beforehand the closing time of the theme park 5, and the contents (route to the closing time and the entrance 51 of the theme park 5) of notice information as the offer-of-information means 47, If the closing time of the theme park 5 comes, the offer-of-information means 47 can carry out call origination of all the mobile stations 1 in the theme park 5 to the means of communication 41, and can make the notice information of the route to the closing time chosen from notice information DB45 to each mobile station 1, and the entrance 51 transmit.

[0044]For example, if the closing time of the theme park 5 draws near, in the information guide center 4, the offer-of-information means 47 will carry out call origination of the mobile station 1<sub>3</sub> to the means of communication 41. Since it turns out that mobile station 1<sub>3</sub> is in the north side of attraction 53<sub>5</sub> as a result of the analysis processing means' 42 detecting the current position of mobile station 1<sub>3</sub> at this time, The offer-of-information means 47 makes the notice information chosen from notice information DB45 transmit to mobile station 1<sub>3</sub> from the means of communication 41, and receive mobile station 1<sub>3</sub>. "it will be closing time soon. The entrances 51 are the direction of southeastern, and about 200 m. While telling closing time like ", the route from a its present location to the entrance 51 can be guided.

[0045]If the fellow users who possessed the mobile station 1 register a meeting time and a meeting place into the offer-of-information means 47 beforehand, If the meeting time comes, the offer-of-information means 47 can carry out call origination of the mobile station 1 beforehand registered into the means of communication 41, and the route from the current position of that a meeting time came and this mobile station 1 detected by the analysis processing means 42 to a meeting place can be made to transmit to this mobile station 1.

[0046]Thus, since predetermined notice information is provided to the mobile station 1 if the time set up beforehand comes, the user who possessed the mobile station 1 can be provided with fine notice information. If the user who possessed the mobile station 1 comes to a



predetermined place and the information provider will, on the other hand, set those place and contents of notice information as the offer-of-information means 47 beforehand to provide predetermined notice information to this user, While the offer-of-information means 47 detects having come to the place where this mobile station 1 was set up beforehand from the position of the mobile station 1 detected by the analysis processing means 42 and carries out call origination of this mobile station 1 to the means of communication 41, The predetermined notice information chosen from notice information DB45 to this mobile station 1 can be made to transmit.

[0047]For example, since attraction 53<sub>1</sub> in the theme park 5 is construction, when it is a restricted area, an information provider sets beforehand the notice information that the place of attraction 53<sub>1</sub> and attraction 53<sub>1</sub> are a restricted area as the offer-of-information means 47. Here, if the user who possessed mobile station 1<sub>4</sub> enters in attraction 53<sub>1</sub> which is a restricted area, the offer-of-information means 47 will detect that mobile station 1<sub>4</sub> is in attraction 53<sub>1</sub> from the current position of mobile station 1<sub>4</sub> detected by the analysis processing means 41. If it carries out, the offer-of-information means 47 will choose from notice information DB45 the notice information set up beforehand, and will transmit to mobile station 1<sub>4</sub> while carrying out call origination of the mobile station 1<sub>4</sub> to the means of communication 41. "attraction 53<sub>1</sub> is under construction now. Since it cannot use, please leave promptly. An accident etc. can be beforehand prevented from providing a user with notice information, demanding cautions from this user, and occurring within an off-limits division like ".

[0048]If the information provider sets notice information, such as an inspection course and a route, as the offer-of-information means 47 when a predetermined inspection course is in the theme park 5, When the mobile station 1 comes to the key point so that the mobile station 1 can inspect along with an inspection course, the offer-of-information means 47, While detecting that the mobile station 1 came to the predetermined place from the current position of the mobile station 1 detected by the analysis processing means and carrying out call origination of this mobile station 1 to the means of communication 41, notice information, such as a route chosen from notice information DB45, can be made to transmit to this mobile station 1. When the mobile station 1 strays off an inspection course, the offer-of-information means 47 can transmit a right route to this mobile station 1 similarly.

[0049]Thus, since he is trying to provide the notice information registered beforehand if the mobile station 1 comes to a predetermined place, fine notice information can be provided by the user who possessed the mobile station 1. Since the composition of those other than notice information DB45 and offer-of-information means 47 is the same as that of the information guide system of Embodiment 1, the explanation is omitted.

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[Translation done.]

## \* NOTICES \*

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1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

## DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is a block diagram showing the information guide system of this embodiment.

[Drawing 2] It is an explanatory view explaining the position detection method of a mobile station same as the above.

[Drawing 3] It is a block diagram of a base station used for the information guide system of Embodiment 2.

[Drawing 4] It is an explanatory view explaining the position detection method of a mobile station same as the above.

[Drawing 5] It is a block diagram of a base station used for the information guide system of Embodiment 3.

[Drawing 6] It is a block diagram of the center used for the information guide system of Embodiment 4.

[Drawing 7] It is a block diagram of the center used for the information guide system of Embodiment 5.

[Drawing 8] It is a block diagram of the center used for the information guide system of Embodiment 6.

[Drawing 9] It is a block diagram of the center used for the information guide system of Embodiment 7.

[Drawing 10] It is an outline lineblock diagram showing the theme park which applied the information guide system same as the above.

[Description of Notations]

1 Mobile station

2<sub>1</sub> - 2<sub>3</sub> base station

3 Switchboard

4 Information guide center

6 Circuit

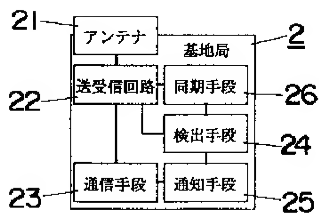
14 and 24 Detection means

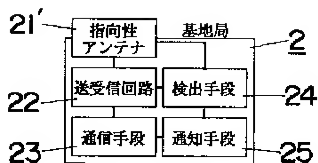
15 and 25 Reporting means

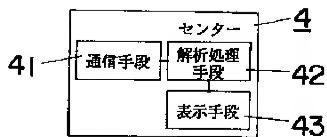
41 Means of communication

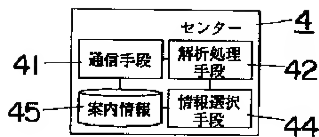
42 Analysis processing means

[Translation done.]

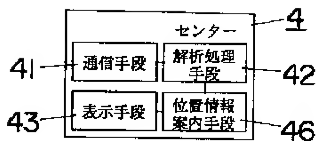


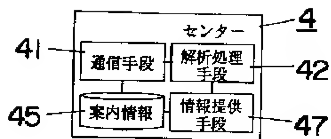


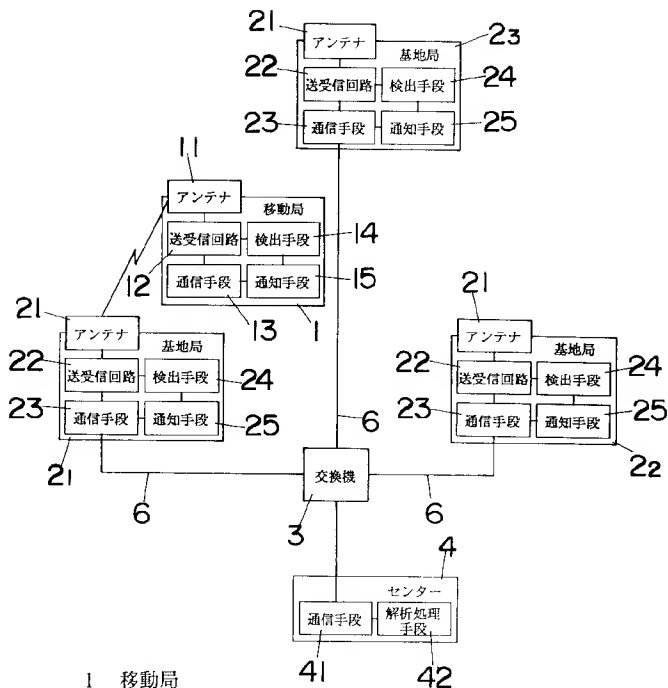




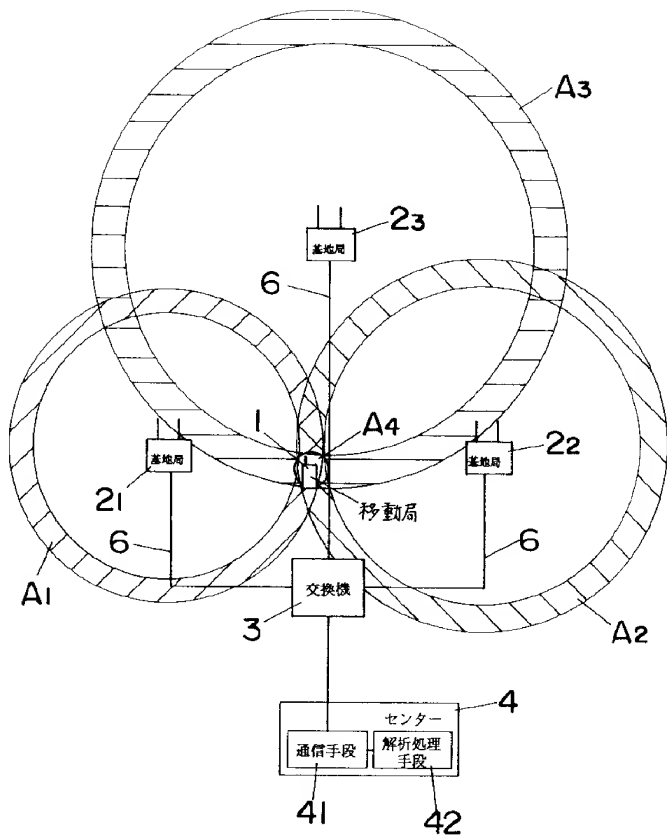


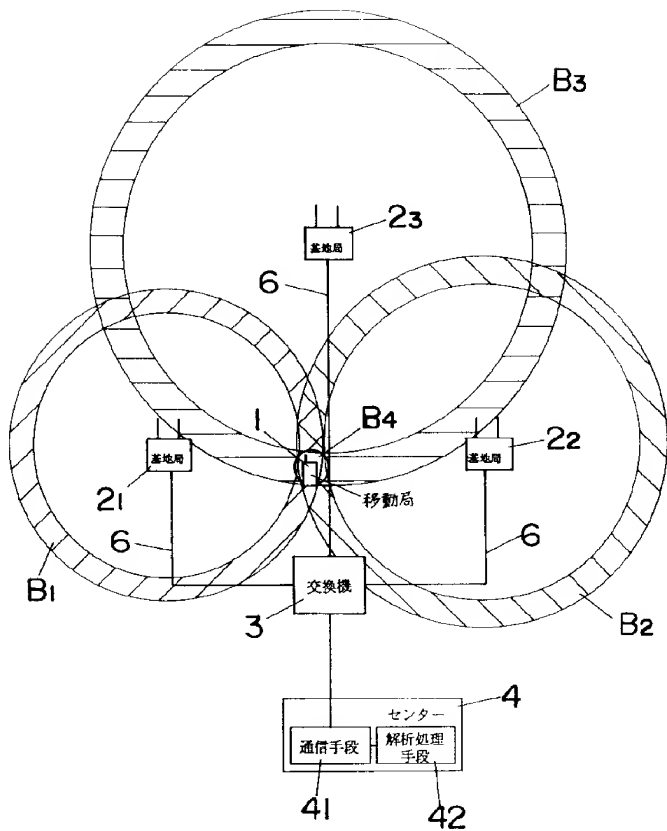


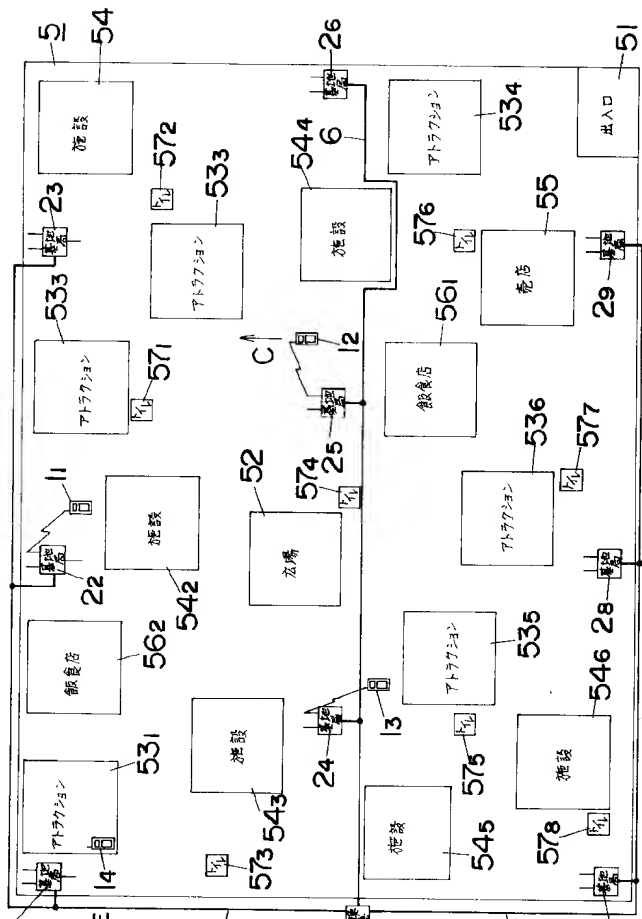




- 1 移動局
- 2, 21 ~ 25 基地局
- 3 交換機
- 4 情報案内センター
- 6 回線
- 14, 24 検出手段
- 15, 25 通知手段
- 41 通信手段
- 42 解析処理手段









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## 【特許請求の範囲】

【請求項 1】 移動局と、移動局との間で無線通信を行う基地局と、基地局が接続された交換機とからなる無線通信システムを備え、交換機及び基地局を介して移動局との間で通信するとともに該通信により該移動局の現在位置に応じた案内情報を該移動局へ送信する情報案内センターを設け、移動局と基地局との間で送受信される電波から該移動局の位置に依存する信号を抽出する検出手段と、検出手段の抽出結果を情報案内センターへ送信する通知手段とを、移動局又は基地局の内少なくとも何れか一方に設けるとともに、通知手段から送信された検出手段の抽出結果より該移動局の位置情報を求める解析処理手段を情報案内センターに設けて成ることを特徴とする情報案内システム。

【請求項 2】 基地局が少なくとも 3 つ以上設けられ、移動局に設けられた検出手段が、各基地局から受信した電波の電界強度を夫々抽出することを特徴とする請求項 1 記載の情報案内システム。

【請求項 3】 基地局が少なくとも 3 つ以上設けられ、基地局に夫々設けられた検出手段が、移動局から受信した電波の電界強度を夫々抽出することを特徴とする請求項 1 記載の情報案内システム。

【請求項 4】 基地局が少なくとも 3 つ以上設けられ、各基地局が移動局へ互いに同期をとって電波を送信しており、移動局に設けられた検出手段が、各基地局から夫々受信した電波の同期状態からの遅延時間を夫々抽出することを特徴とする請求項 1 記載の情報案内システム。

【請求項 5】 基地局が少なくとも 3 つ以上設けられ、各基地局が移動局へ互いに同期をとって電波を送信しており、基地局に夫々設けられた検出手段が、移動局から受信した電波の同期状態からの遅延時間を夫々抽出することを特徴とする請求項 1 記載の情報案内システム。

【請求項 6】 基地局に指向性アンテナを設け、該指向性アンテナで受信した移動局からの電波より、検出手段が電波の電界強度と該移動局の方位情報とを抽出することを特徴とする請求項 1 記載の情報案内システム。

【請求項 7】 検出手段が、所定のタイミングで位置に依存する信号を抽出することを特徴とする請求項 1乃至6記載の情報案内システム。

【請求項 8】 解析処理手段によって得られた移動局の位置情報を表示する表示手段を情報案内センターに設けて成ることを特徴とする請求項 1 記載の情報案内システム。

【請求項 9】 解析処理手段によって得られた移動局の位置情報に基づいて、予め設定された案内情報の中から該移動局に近接する案内情報を自動的に選択する情報選択手段を情報案内センターに設けて成ることを特徴とする請求項 1 記載の情報案内システム。

【請求項 10】 解析処理手段によって得られた複数の移動局の位置情報に基づいて、ある移動局に別の移動局の

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位置情報を案内情報として送信する位置情報案内手段を情報案内センターに設けて成ることを特徴とする請求項 1 記載の情報案内システム。

【請求項 11】 予め設定された時間に所定の移動局を発呼し、該移動局へ所定の案内情報を送信する第 1 の情報提供手段を情報案内センターに設けて成ることを特徴とする請求項 1 記載の情報案内システム。

【請求項 12】 移動局が予め設定された位置になると、該移動局を発呼して、所定の案内情報を送信する第 2 の情報提供手段を情報案内センターに設けて成ることを特徴とする請求項 1 記載の情報案内システム。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】 本発明は、無線通信システムを用いて、移動局を所持する利用者に、利用者の現在位置に応じた案内情報を提供する情報案内システムに関するものである。

【0002】

【従来の技術】 従来、展示会場や美術館やテーマパークなどの屋内あるいは屋外の会場において、利用者に会場内の案内を行う方法としては、所定の場所に案内所や案内板を設置して案内を行ったり、無線ガイドシステムのように所定の場所に利用者が来る全ての利用者に對して同様の案内を行うものがあった。また、汎用位置システム（以下、GPS（Global Positioning System）と略す）を利用したナビゲーションシステムのように、GPS によって得られた位置情報から利用者の現在位置を特定し、予め登録された情報を利用者に提供するものもあった。さらに、携帯電話などの無線通信システムにおいても、基地局と移動局との間で通信を行うために、移動局の位置情報や着信エリア又は基地局単位で管理しており、この位置情報を利用して移動局を所持した利用者に現在位置に応じた案内情報を提供することも考えられる。

【0003】

【発明が解決しようとする課題】 上述した情報案内システムにおいて、案内所や案内板のように所定の場所に設置されているものでは、利用者が案内を受けるためには、まず、利用者が案内所や案内板の設置場所を確して、その設置場所まで行かなければならないという問題があった。

【0004】 一方、無線ガイドシステムでは、利用者が所定の場所に来ると、予め決められた案内情報を不特定多数の利用者に提供しているので、必ずしも利用者が望んでいる案内情報を提供できるとは限らないという問題があった。また、GPS を利用したナビゲーションシステムでも、予め登録された案内情報のみを提供していたので、必ずしも利用者が望んでいる案内情報を提供できるとは限らないという問題があった。

【0005】 さらに、無線通信システムを利用したもの



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では、移動局の位置情報が着信エリア又は基地局単位で管理されており、位置情報の精度が基地局の電波の届く範囲となるので、県立大会場や競輪場やテーマパークなどの会場において利用者の現在位置を特定するには、位置情報の精度が低く、実用的ではないという問題があった。

【0006】そこで、GPSと無線通信システムとを組み合わせ、GPSによって得られた利用者の現在位置をもとに、利用者の望む案内情報を遠隔から無線情報システムによって提供することも可能ではあるが、その場合GPSと無線通信システムの両方を備えたシステムを構築する必要があり、システムが高価になるという問題があった。

【0007】本発明は上記問題点に鑑みて為されたものであり、請求項1乃至12の発明の目的は、移動局を所属する利用者の現在位置を抽出し、その現在位置に応じた案内情報を利用者に提供することのできる情報案内システムを提供することにある。

【0008】

【課題を解決するための手段】請求項1の発明では、上記目的を達成するために、移動局と、移動局との間で無線通信を行う基地局と、基地局が接続された交換機とからなる無線通信システムを備え、交換機及び基地局を介して移動局との間で通信するとともに該通信により該移動局の現在位置に応じた案内情報を該移動局へ送信する情報案内センターを設け、移動局と基地局との間で送受信される電波から該移動局の位置に依る信号を抽出する抽出手段と、抽出手段の抽出結果を情報案内センターへ送信する通知手段とを、移動局又は基地局の内部に含むも何れか一方に設けるとともに、通知手段から送信された抽出手段の抽出結果より該移動局の位置情報を求める解析処理手段を情報案内センターに設けているので、移動局又は基地局に設けられた抽出手段の抽出結果から移動局の正確な位置情報を求めることができる。また、無線通信システムのみを利用しているため、GPSと無線通信システムとを組み合わせた場合に比べて、システム全体のコストを抑えることができる。

【0009】請求項2の発明では、請求項1の発明において、基地局が少なくとも3つ以上設けられ、移動局に設けられた抽出手段が、各基地局から受信した電波の電界強度を夫々抽出しており、請求項3の発明では、基地局に夫々設けられた抽出手段が、移動局から受信した電波の電界強度を夫々抽出しているため、電波の電界強度から移動局と各基地局との距離を夫々求めて、移動局のいる範囲を正確に求めることができる。また、電波の電界強度を正確に求めることができる。また、移動局及び基地局は受信した電波の電界強度を抽出する機能を夫々備えているので、従来の移動局及び基地局に新たに特別な機能を追加することなく、適用することができる。

【0010】請求項4の発明では、基地局が少なくとも

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3つ以上設けられ、各基地局が移動局へ互いに同期をとって電波を送信しており、移動局に設けられた抽出手段が、各基地局から夫々受信した電波の同期状態からの遅延時間を夫々抽出しており、請求項5の発明では、基地局に夫々設けられた抽出手段が、移動局から受信した電波の同期状態からの遅延時間を夫々抽出しているため、電波の遅延時間から移動局と各基地局との距離を夫々求めて、移動局のいる範囲を絞り込むことにより、移動局の位置情報を正確に求めることができる。また、電波の電界強度を抽出した場合、他の移動局や基地局、又は、他の無線通信システムとの干渉によって抽出誤差範囲が一定ではないが、遅延時間を抽出する場合、抽出誤差範囲が時間の測定精度によるものだけなので、抽出誤差範囲が略一定となり、移動局の位置情報を精度よく求めることができる。

【0011】請求項6の発明では、請求項1の発明において、基地局に指向性アンテナを設け、該指向性アンテナで受信した移動局からの電波より、抽出手段が電波の電界強度と該移動局の方位情報とを抽出しているため、この基地局からの移動局の方向と距離を求めることにより、一つの基地局で移動局の位置を求めることができる。

【0012】請求項7の発明では、請求項1乃至6の発明において、抽出手段が所定のタイミングで位置に依る信号を抽出しているため、抽出手段が位置に依る信号の抽出に要する時間を短くして、移動局、基地局、交換機及び情報案内センターが移動局の位置抽出以外の処理を行う時間を増やすことができる。請求項8の発明では、請求項1の発明において、解析処理手段によって得られた移動局の位置情報を表示する表示手段を情報案内センターに設けているので、情報提供者は情報案内センターにないが、移動局の現在位置や移動方向を詳細に把握することができる。

【0013】請求項9の発明では、請求項1の発明において、解析処理手段によって得られた移動局の位置情報に基づいて、予め設定された案内情報の中から該移動局に送信する案内情報を自動的に選択する情報選択手段を情報案内センターに設けているため、移動局の現在位置に応じた案内情報を自動的に送信することができる。請求項10の発明では、請求項1の発明において、解析処理手段によって得られた複数の移動局の位置情報に基づいて、ある移動局に別の移動局の位置情報を案内情報として送信する位置情報案内手段を情報案内センターに設けているため、子供や老人等の同伴者に移動局を持たせておけば、子供や老人等の同伴者がはぐれても、この移動局の現在位置を受信することにより、はぐれた同伴者をすくに見つけることができる。

【0014】請求項11の発明では、請求項1の発明において、予め設定された時間に所定の移動局を発生し、該移動局へ所定の案内情報を送信する第1の情報提供手

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段を情報案内センターに設けているので、移動局を所持した利用者に、時間及び位置情報をもとに、きめ細かい案内情報を提供することができる。請求項12の発明では、請求項1の発明において、移動局が予め設定された位置にくると、該移動局を発呼して、所定の案内情報を送信する第2の情報提供手段を情報案内センターに設けているので、移動局が立入禁止区域に入るのを警告したり、所定のルートに沿って移動局を導いたりすることができる。

【0015】

【発明の実施の形態】本発明の実施の形態を図面を参照して説明する。

（実施形態1）本実施形態の情報案内システムでは、図1に示すように、無線通信システムとしてパーソナルハンディホンシステム（以下、PHS（Personal Handy-phone System）と略す）を利用しており、1は移動局（PHS子機）、2、…は所定のエリア内の移動局1との間で無線通信を行う基地局、3は回線6を介して直接の基地局2、…が移動局2と交換機、4は交換機3及び基地局2、…を介して移動局1との間で通信を行うとともに、移動局1の現在位置に応じた案内情報を該移動局1に送信する情報案内センターを示す。

【0016】移動局1は、アンテナ1を介して基地局2、…との間で電波信号を送受信する送受信回路12と、送受信回路12を介して基地局2、…との間で通信を行う通信手段13と、基地局2、…から受信した電波の電界強度を検出する検出手段14と、検出手段14の検出結果を基地局2、…及び交換機3を介して情報案内センターへ送信する通知手段15とから構成される。

【0017】基地局2、…は、アンテナ2を介して移動局1との間で電波信号を送受信する送受信回路22、送受信回路22を介して移動局1との間で通信を行うとともに、交換機3との間で通信を行う通信手段23と、移動局1から受信した電波の電界強度を検出する検出手段24と、検出手段24の検出結果を交換機3を介して情報案内センターへ送信する通知手段25とから構成される。

【0018】情報案内センター4は、交換機3及び基地局2、…を介して、移動局1と通信する通信手段41と、移動局1から送られる各基地局2、…の位置に併する信号あるいは各基地局2、…から送られる移動局1の位置に併する信号に基づいて移動局1の現在位置を解析する解析処理手段42とから構成される。ところで、移動局1と基地局2、…との間で通信を行う際、移動局1は常に所定の基地局2、…の中から受信電波の電界強度が最も強い基地局を併して、該基地局との間で通信を行っており、検出手段14が、各基地局2、…から受信した電波の電界強度を検出し、通知手段15が、基地局2、…及び交換機3を介して検出手段14の検出結果を情報案内センター4へ送信する。

【0019】また、基地局2、…でも、移動局1との間で通話中に該移動局1からの電波の電界強度が低下すると、該移動局1に他の基地局へハンドオーバーするように指示するようになっており、検出手段24が、移動局1から受信した電波の電界強度を検出し、通知手段25が、検出手段24の検出結果を情報案内センター4へ送信する。

【0020】ここで、各基地局2、…の設置場所が予め分かっている。移動局1及び各基地局2、…から送られる電波の出力を固定とすると、情報案内センター4の解析処理手段42は、電波の電界強度の減衰量と伝播距離との換算式をもとに、通信手段41が受信した検出手段14又は24の検出結果から、移動局1と各基地局2、…との間の距離を求めることができる。その結果、移動局1がいると予想される範囲を、各基地局2、…を中心とする環状の予想エリアA、…に絞り込むことができる。解析処理手段42は、全ての予想エリアA、…を重ねるエリアA、内に移動局1がいるものと判断し、移動局1の位置情報を正確に求めることができる。そして、情報案内センター4は、この位置情報をもとに、移動局1を所持した利用者に、現在位置における最適な案内情報を提供することができる。

【0021】尚、本実施形態では、予想エリアA、…は略環状となっているが、解析処理手段42の処理の結果、予想エリアが略環状以外の範囲ともなっても良い。また、本実施形態では、移動局1及び基地局2、…の両方に、検出手段14、24を設けているが、移動局1又は基地局2、…のいずれか一方のみに検出手段14、24を設けても良い。

【0022】ところでPHSでは、移動局1と基地局2、…との間の電波キャリア上のデジタル信号がmS秒のフレームに分割され、各フレームはさらに8つのスロットに分割されており、4スロットが下り（基地局→移動局）に、残りの4スロットが上り（移動局→基地局）に割り当てられている。ここで、移動局1と情報案内センター4とが基地局2、…及び交換機3を介して通話中に、常に移動局1の位置情報を検出しようとする、他の基地局2、…でも移動局1からの電波を監視する必要があり、その間、基地局2、…は他の移動局と通信することができなくなる。そこで、移動局1の発呼時のみ、該移動局1の位置情報を検出するようにすれば、全ての基地局2、…は、移動局1の発呼時に最初の制御チャンネル（1番目のスロット）で移動局1の位置に併する信号を検出すれば良く、PHSでは1フレームが5mSとなっているので、移動局1の位置検出に要する時間も5mSで済む。また、制御チャンネルは通話には使用されないで、基地局2、…が他の移動局1と通話できなくなるようなことはない。

【0023】また、本発明の情報案内システムでは、無線通信システムのみで実現されているので、GPSと無

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無線通信システムとを併用した場合に比べて、システムの稼働に要するコストを低減することができる。さらに、無線通信システムでは、移動局 1 及び基地局 2、…は、それぞれ、受信した電波の電界強度を検出する機能を有している。現状の移動局 1 や基地局 2、…に新たな機能を追加することなく実現することができる。

【0024】尚、移動局 1 の位置検出を移動局 1 の発呼時ではなく、移動局 1 への着呼時に行っても良いし、移動局 1 が現在位置を PHS のネットワーク上に登録する際に行っても良いし、一定の間隔で行うようにしても良い。移動局 1 の位置情報を検出する回数を少なくして、基地局 2、…の負担を減らし、基地局 2、…が他の移動局 1 と通信できなくなるような事態を防いでいる。また、移動局 1、…基地局 2、…、交換機 3 及び情報案内センター 4 が移動局 1 の位置検出以外の処理を行う時間を増やすことができ、各部を有効に活用することができる。

【0025】ここで、本実施形態の情報案内システムを、図 1 に示すテマパーク 5 に適用し、テマパーク 5 を運営する団体が、テマパーク 5 に入場した利用者に対して、各種の案内情報を提供する場について説明する。まず、利用者がテマパーク 5 に入場する際に、利用者は移動局 1、…を渡される。テマパーク 5 内で、移動局 1、…を所持した利用者が自分の行きたい場所への道順が分からない場合、利用者はその場所で移動局 1、…から特定のダイヤル番号を発呼して、情報案内センター 4 を呼び出し、情報案内センター 4 に自分の行きたい場所までの道順を尋ねる。移動局 1、…から呼び出された情報案内センター 4 では、解析処理手段 4 2 が、上述のようにして移動局 1、…の位置情報を調べ、その場所から利用者の行きたい場所までの道順を通信手段 4 1 に移動局 1、…へ送信させる。

【0026】例えば、移動局 1、…を所持した利用者が、一番近い場所にあるトイレを情報案内センター 4 に尋ねると、情報案内センター 4 では、解析処理手段 4 2 が、移動局 1、…を所持した利用者は基地局 2、…アトラクション 5 3、との間にあることを検出し、一番近いトイレはアトラクション 5 3 の西側にあるトイレ 5 7、と判断して、通信手段 4 1 から移動局 1、…に案内情報を送信し、この移動局 1、…を所持した利用者に対して、例えば「一番近いトイレは 5 7、です。ここからですと西西の方向へ 5 0 m 行ったところにあります。」というように案内情報を提供する。

【0027】このように、移動局 1、…を所持した利用者は、テマパーク 5 内のどこにいても、又、自分の居る場所が分からなくても、自分の行きたい場所までの案内情報を受けることができる。

(実施形態 2) とここで、PHS などの無線通信では、移動局 1 と基地局 2、…との間で授受される電波キャリア上のデジタル信号の同期がとれないとすれば、正當

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に通信を行うことができないので、移動局 1 と基地局 2、…との間でデジタル信号の同期をとる必要があり、移動局 1 は基地局 2、…から送信されるスロットに同期させて、基地局 2、…へ信号を送信する機能を有している。したがって、各基地局 2、…からそれぞれ送られるデジタル信号が同期状態からとれただけ遅延しているか、容易に検出することができる。例えば、実施形態 1 では移動局 1 の検出手段 1 4 は各基地局 2、…から送信される電波の電界強度を検出しているが、本実施形態では、検出手段 1 4 は各基地局 2、…から送られるデジタル信号の遅延時間を検出している。そして、通知手段 1 5 は、基地局 2、…及び交換機 3 を介して、検出手段 1 4 で検出した各基地局 2、…からの信号の遅延時間を、情報案内センター 4 へ送信する。

【0028】一方、基地局 2 は、図 3 に示すように、他の基地局 2 との間で同期をとって移動局 1 にデジタル信号を送出するための同期手段 2 8 を備えている。ここで、実施形態 1 では検出手段 2 4 は移動局 1 から受信した電波の電界強度を検出したが、本実施形態では、検出手段 2 4 は移動局 1 から受信した電波キャリア上のデジタル信号が同期状態からとれただけ遅延しているかを検出し、通知手段 2 5 が遅延時間の検出結果を情報案内センター 4 へ送信する。

【0029】情報案内センター 4 では、通信手段 4 1 が、移動局 1 又は基地局 2、…から送信された遅延時間の検出結果を受信する。空気中における電波の伝播速度は一定であるので、解析処理手段 4 2 は、電波の遅延時間と伝播距離の換算式をもとに遅延時間の検出結果より、各基地局 2、…から移動局 1 までの距離を求めることができる。その結果、図 4 に示すように、解析処理手段 4 2 は、移動局 1 がいけると予想される範囲を、各基地局 2、…を中心とする略楕円の予想エリア B、…に絞り込むことができ、全ての予想エリア B、…が重なるエリア B<sub>0</sub> に移動局 1 が居るものと判断し、移動局 1 の位置情報を得ることができる。そして、情報案内センター 4 は、移動局 1 の位置情報を求めることにより、移動局 1 を所持した利用者の現在位置における最適な案内情報を提供することができる。

【0030】実施形態 1 では、検出手段 1 4、2 4 が検出した電波の電界強度から移動局 1 と基地局 2、…との距離を求めているが、検出手段 1 4、2 4 によって検出された電界強度の検出誤差範囲は、他の移動局や基地局、又は、他の無線通信システムとの干渉などによって一定にならない可能性がある。一方、本実施形態では、検出手段 1 4、2 4 がデジタル信号の遅延時間を検出しており、遅延時間の検出誤差範囲は時間の測定精度によるものだけでなく、一定となるので、電界強度を検出した場合に比べて、移動局 1 の現在位置を精度良く検出することができる。

【0031】尚、予想エリア B、…は略楕円状となってい

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るが、解析処理手段42の処理結果、予想エリアが幅露坑以外の範囲となっても良い。また、検出手段14、24及び同期手段26以外の情報案内システムの構成は実施形態1と同様であるので、その説明は省略する。

(実施形態3) 実施形態1、2では、移動局1と基地局2、…との間の電波の電界強度や、デジタル信号の遅延時間から、移動局1と基地局2、…との間の距離を求め、移動局1の位置情報を求めているが、本実施形態では、図5に示すように、基地局2にそれぞれ約15度の指向性を持った指向性アンテナ21'を24本設けており、24本の指向性アンテナ21'は、水平面内の全面にわたって電波を受渡できるように、水平面内において約15度の間隔で配置されている。そして、検出手段24は、24本の指向性アンテナ24'の内、移動局1からの電波を最も強い電界強度で受信した指向性アンテナ21'と、この指向性アンテナ21'が受信した電流の電界強度を検出する。移動局1からの電波を、最も強い電界強度で受信した指向性アンテナ21'の指向する方向に移動局1がいるので、通知手段5は、この指向性アンテナ21'が受信した電流の電界強度と共に、この指向性アンテナ21'の指向する方向を移動局1の方位情報として、情報案内センター4の通信手段41へ送信する。

【0032】ここで、移動局1の出力を固定とし、基地局2の位置が分かっているとすると、解析処理手段42は、電波の電界強度の誘電率と伝搬距離との換算式をもとに、通信手段41が受信した移動局1からの電波の電界強度より、基地局2と移動局1との間の距離を求めることができる。また、解析処理手段42は、該移動局1の方位情報を受け取っているので、この方位情報と、基地局2から移動局1までの距離とから、移動局1の位置を求めることができる。

【0033】例えばPHSでは、基地局2の出力や設備場所等によっても異なるが、基地局2の電波が届く範囲は標準で半径100m程度である。したがって、指向性アンテナ21'の指向性を約15度とすれば、移動局1の位置を最大20m程度の誤差で検出することができる。また、一つの基地局2のみで移動局1の現在位置を検出することができるので、実施形態1又は2のように、多くの基地局2を設置する必要がなく、全体のシステムを簡素化して、システムを構築するために必要なコストを低減することができる。

【0034】尚、基地局2以外の構成は実施形態1の情報案内システムと同様であるので、その説明は省略する。

(実施形態4) 本実施形態では、実施形態1の情報案内システムにおいて、図6に示すように、解析処理手段42によって検出された移動局1の位置情報を表示する表示手段43を情報案内センター4に設けている。

【0035】したがって、情報案内センター4では、情

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報提供者が表示手段43により通信中の移動局1の状況(現在位置や移動方向など)を容易に把握することができ、該移動局1が移動中に通信しているも、移動局1の移動方向に応じて、さらに詳細な案内情報を移動局1に提供することができる。例えば、本実施形態の情報案内システムを図10に示すテーマパーク5に適用する場合、移動局1を所持した利用者が施設54、の西側を図10中矢印Cの方向に移動している場合、情報案内センター4では、情報提供者が、表示手段43の表示から移動局1を、所持した利用者が矢印Cの方向へ移動していることと判断し、この利用者に対して例えば「現在、アトラクション53、のほうへ向かっています。さらに進むとアトラクション53、です。」というように、利用者の現在位置に関する案内情報だけではなく、利用者の移動方向に応じて、さらに詳細な案内情報を提供することができる。

【0036】尚、表示手段43以外の構成は実施形態1と同様であるので、その説明は省略する。

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(実施形態5) 本実施形態では、実施形態1の情報案内システムにおいて、図7に示すように、所定の案内情報が予め登録された案内情報データベース(以下、案内情報DBと略す)45と、解析処理手段42によって検出された移動局1の位置情報をもとにデータベース45から必要な案内情報を自動的に選択する情報選択手段44とを設けており、通信手段41は情報選択手段44によって選択された案内情報を交換機3及び基地局2、…を介して移動局1に送信する。

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【0037】ここで、案内情報の内容毎にそれぞれ所定のダイヤル番号を設定しておけば、情報選択手段44が、移動局1から発呼されたダイヤル番号と、解析処理手段42によって検出された移動局1の位置情報とに基づいて、案内情報DB45から必要な案内情報を自動的に選択し、通信手段41がこの案内情報を交換機3及び基地局2、…を介して移動局1に送信するので、案内情報センター4の自動化を図ることができる。

【0038】本実施形態の情報案内システムを図10に示すテーマパーク5に適用する場合について説明する。ここで、移動局1、…が第1のダイヤル番号を発呼すれば現在位置におけるアトラクション53、の待ち時間が案内され、第2のダイヤル番号を発呼すれば現在位置の近くにあるトイレ57、…の場所が案内され、第3のダイヤル番号を発呼すれば帰り道(現在位置から出入口51までの道順)が案内されるというように、案内情報の内容毎に第1～第3のダイヤル番号が夫々設定されている。

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【0039】例えば、移動局1、を所持した利用者が近くにあるトイレの場所を知りたい場合、利用者は移動局1、を用いて第2のダイヤル番号を発呼する。この時、情報案内センター4では、解析処理手段42が上述のようにして移動局1、の現在位置(アトラクション53、

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の北側」を抽出し、情報選択手段44は移動局1の現在位置に応じて案内情報DB45から最も近いトイレの案内情報を選択し、この案内情報を通信手段41に移動局1へ送信させ、移動局1に対して「一番近いトイレは、ここからですと南西の方向約50mのところにあります。」というように案内情報を提供することができる。

【0046】尚、情報選択手段44及び案内情報DB45以外の構成は実施形態1の情報案内システムと同様であるので、その説明は省略する。

(実施形態6) 本実施形態では、実施形態1又は4の情報案内システムにおいて、図8に示すように、解析処理手段42によって抽出された全ての移動局1の位置情報を管理する位置情報案内手段46と、位置情報案内手段46によって管理される全ての移動局1の位置情報を表示する表示手段43とを備えている。そして、ある移動局1が情報案内センター4を発呼して、別の移動局1の現在位置を問い合わせると、情報案内センター4では、位置情報案内手段46が全ての移動局1の位置情報を管理しており、表示手段43に全ての移動局1の現在位置が表示されているので、情報案内センター4を発呼した移動局1の現在位置と、この移動局1によって問い合わせられた別の移動局1の現在位置とから、別の移動局1までの距離を通信手段41から移動局1へ送信させることができる。なお、表示手段43の代わりに上述した情報選択手段44を用い、移動局1から別の移動局1の現在位置の問い合わせがあった場合、位置情報案内手段46が管理している全ての移動局1の位置情報から、情報選択手段44が別の移動局1の位置情報を選択し、この位置情報を通信手段41から移動局1に送信させるようにしてもよい。

【0047】本実施形態の情報案内システムを図10に示すテーマパーク5に適用する場合について説明する。親子連れの利用者の子供がテーマパーク5内で迷子になった場合、例えば、親が移動局1を所持し、子供が移動局1を所持しているとする、親は、子供を探すために、移動局1を用いて情報案内センター4を発呼し、情報案内センター4に移動局1の現在位置を尋ねる。情報案内センター4では、位置情報案内手段46が全ての移動局1の現在位置を管理しており、表示手段43に全ての移動局1の現在位置が表示されているので、子供の所持した移動局1が施設54の北側にあり、親の所持した移動局1が施設54の西側にあることが容易に分かるので、親の所持する移動局1に対して「移動局1は施設54の北側にいます。ここからですと北西の方向に約100mです。」というように、他の移動局1の現在位置を案内情報として提供することができる。

【0048】尚、表示手段43及び位置情報案内手段46以外の構成は、実施形態1又は4の情報案内システム

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と同様であるので、その説明は省略する。

(実施形態7) 本実施形態では、実施形態1の情報案内システムにおいて、図9に示すように、所定の案内情報が予め登録された案内情報DB45と、予め設定された時間に所定の移動局1を発呼し、該移動局1に対して案内情報DB45から選択した所定の案内情報を提供するとともに、予め設定された場所に移動局1がくると、該移動局1を発呼し、該移動局1に対して案内情報DB45から選択した所定の案内情報を提供する第1及び第2の情報提供手段たる情報提供手段47とを設けている。

【0043】本実施形態の情報案内システムを、図10に示すテーマパーク5に適用した場合について説明する。情報提供者が移動局1を所持した利用者にテーマパークの閉館時間を案内したい場合、情報提供者は情報提供手段47にテーマパーク5の閉館時間と案内情報の内容(テーマパーク5の閉館時間と出入口51への距離)とを予め設定しておけば、テーマパーク5の閉館時間がくると、情報提供手段47は、通信手段41にテーマパーク5内の全ての移動局1を発呼させ、各移動局1に対して案内情報DB45から選択した閉館時間及び出入口51までの距離といった案内情報を送信させることができる。

【0044】例えば、テーマパーク5の閉館時間が近づくと、情報案内センター4では、情報提供手段47が通信手段41に移動局1を発呼させる。この時、解析処理手段42が移動局1の現在位置を抽出した結果、移動局1がアトラクション3の北側にいることが分かるので、情報提供手段47は案内情報DB45から選択した案内情報を通信手段41から移動局1へ送信させ、移動局1に対して「もうすぐ閉館時間です。出入口51は南東の方向、約200mです。」というように、閉館時間を知らせるとともに、現在地から出入口51までの距離を案内することができる。

【0045】また、移動局1を所持した利用者同定が、集合時間及び集合場所を予め情報提供手段47に登録しておけば、その集合時間がくると、情報提供手段47が通信手段41に予め登録されている移動局1を発呼させ、該移動局1に対して、集合時間がきたことと、解析処理手段42によって抽出された該移動局1の現在位置から集合場所への距離を送信させることができる。

【0046】このように、予め設定された時間がある移動局1に対して所定の案内情報を提供しているので、移動局1を所持した利用者に、きめ細かく案内情報を提供することができる。一方、移動局1を所持した利用者が所定の場所にくると、この利用者に対して所定の案内情報を提供したい場合、情報提供者が情報提供手段47にその場所と案内情報の内容とを予め設定しておけば、情報提供手段47は、解析処理手段42によって抽出された移動局1の位置から、該移動局1が予め設定された場所にくることを検出し、通信手段41に該移動局

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1 を発呼させるとともに、該移動局 1 に対して案内情報 D B 4 5 から選択した所定の案内情報を送信させることができる。

【0147】例えば、テーマパーク内のアトラクション 3、が工事のため立入禁止区域になっている場合、情報提供者は、アトラクション 5 3、の場所及びアトラクション 5 3、が立入禁止区域になっているという案内情報を情報提供手段 4 7 に予め設定する。ここで、移動局 1、を所持した利用者が、立入禁止区域であるアトラクション 5 3、内に入ると、情報提供手段 4 7 は、解析処理手段 4 1 によって検出された移動局 1、の現在位置から、移動局 1、がアトラクション 5 3、内にいることを検出する。すると、情報提供手段 4 7 は、通信手段 4 1 に移動局 1、を発呼させるとともに、案内情報 D B 4 5 から予め設定された案内情報を選択して移動局 1、に送信し、「アトラクション 5 3、はたいてい工事中です。ご利用できませんので、速やかに退去して下さい。」というように利用者に案内情報を提供する。この利用者に注意を促して、立入禁止区域内で事故などが発生するのを未然に防止することができる。

【0148】また、テーマパーク内に所定の見学コースがある場合、情報提供者は情報提供手段 4 7 に見学コースと道順などの案内情報を設定しておけば、移動局 1 が見学コースに沿って見学できるように、移動局 1 が所要所になると、情報提供手段 4 7 は、解析処理手段によって検出された移動局 1 の現在位置から移動局 1 が所定の場所にきたことを検知し、通信手段 4 1 に該移動局 1 を発呼させるとともに、案内情報 D B 4 5 から選択した道順などの案内情報を該移動局 1 に送信させることができる。また、移動局 1 が見学コースから外れた場合にも、同様に、情報提供手段 4 7 は該移動局 1 に正しい道順を送信することができる。

【0149】このように、移動局 1 が所定の場所になると、予め登録された案内情報を提供するようにしているので、移動局 1 を所持した利用者によりきめ細かな案内情報を提供することができる。尚、案内情報 D B 4 5 及び情報提供手段 4 7 以外の構成は実施形態 1 の情報案内システムと同様であるので、その説明は省略する。

【0150】

【発明の効果】請求項 1 の発明は、上述のように、移動局と、移動局との間で無線通信を行う基地局と、基地局が接続された交換機とからなる無線通信システムを備え、交換機及び基地局を介して移動局との間で通信するとともに該通信により該移動局の現在位置に応じた案内情報を該移動局へ送信する情報案内センターを設け、移動局と基地局との間で送受信される電波から該移動局の位置に依る信号を検出する検出手段と、検出手段の検出結果を情報案内センターへ送信する通知手段とを、移動局又は基地局の内少なくとも何れか一方に設けるとともに、通知手段から送信された検出手段の検出結果より

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該移動局の位置情報を求める解析処理手段を情報案内センターに設けているので、移動局又は基地局に設けられた検出手段の検出結果から移動局の正確な位置情報を求めることができ、移動局の現在位置に応じた案内情報を移動局に送信できるという効果がある。また、無線通信システムのみを利用しているで、GPS と無線通信システムとを組み合わせた場合に比べて、システム全体のコストを抑えることができるという効果もある。請求項 2 の発明は、基地局が少なくとも 3 つ以上設けられ、移動局に設けられた検出手段が、各基地局から受信した電波の電界強度を夫々検出しており、請求項 3 の発明は、基地局に夫々設けられた検出手段が、移動局から受信した電波の電界強度を夫々検出しているで、電波の電界強度から移動局と各基地局との距離を夫々求めて、移動局のいる範囲を絞り込むことにより、移動局の位置情報を正確に求めることができ、請求項 1 の発明と同様に、移動局の現在位置に応じた案内情報を移動局に送信できるという効果がある。また、移動局及び基地局は受信した電波の電界強度を検出する機能を夫々備えているので、従来の移動局及び基地局に新たに特別な機能を追加することなく、活用できるという効果もある。

【0151】請求項 4 の発明は、基地局が少なくとも 3 つ以上設けられ、各基地局が移動局へ互いに同期をとって電波を送信しており、移動局に設けられた検出手段が、各基地局から夫々受信した電波の同時状態からの遅延時間を夫々検出しており、請求項 5 の発明は、基地局に夫々設けられた検出手段が、移動局から受信した電波の同期状態からの遅延時間を夫々検出しているで、電波の遅延時間から移動局と各基地局との距離を夫々求めて、移動局のいる範囲を絞り込むことにより、移動局の位置情報を正確に求めることができ、請求項 1 の発明と同様に、移動局の現在位置に応じた案内情報を移動局に送信できるという効果がある。また、電波の電界強度を検出した場合、他の移動局や基地局、又は、他の無線通信システムとの干渉によって検出誤差範囲が一定ではないが、遅延時間を検出する場合、検出誤差範囲が時間の測定精度によるものだけなので、検出誤差範囲が略一定となり、移動局 1 の位置情報を精度良く求めることができるという効果もある。

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【0152】請求項 6 の発明は、基地局に指向性アンテナを設け、該指向性アンテナで受信した移動局からの電波より、検出手段が電波の電界強度と該移動局の方位情報とを検出しているで、この基地局からの移動局の方向と距離を求めることによって、一つの基地局で移動局の位置を求めることができるという効果がある。請求項 7 の発明は、検出手段が、所定のタイミングで位置に依る信号を検出しているで、検出手段が位置に依る信号の検出に要する時間を短くして、移動局、基地局、交換機及び情報案内センターが移動局の位置検出以外の処理を行う時間を増やすことができ、各部を有効に活用

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できるといふ効果がある。

【01053】請求項8の発明は、解析処理手段によって得られた移動局の位置情報を表示する表示手段を情報案内センターに設けているので、情報提供者は情報案内センターにいながら、移動局の現在位置や移動方向を詳細に把握することができ、移動局を所持した利用者にきめ細かい案内情報を提供できるといふ効果がある。請求項9の発明は、解析処理手段によって得られた移動局の位置情報に基づいて、予め設定された案内情報の中から該移動局に送信する案内情報を自動的に選択する情報選択手段を情報案内センターに設けているので、移動局の現在位置に応じた案内情報を自動的に送信することができ、情報案内センターの省人化が図れるという効果がある。

【01054】請求項10の発明は、解析処理手段によって得られた複数の移動局の位置情報に基づいて、ある移動局に別の移動局の位置情報を案内情報として送信する位置情報案内手段を情報案内センターに設けているので、子供や老人等の同伴者に別の移動局を持たせておけば、子供や老人等の同伴者はかくれても、この移動局の現在位置を受信することにより、はぐれた同伴者をすぐに見つけ出すことができるという効果がある。

【01055】請求項11の発明は、予め設定された時間に所定の移動局を発呼し、該移動局へ所定の案内情報を送信する第1の情報提供手段を情報案内センターに設けているので、移動局を所持した利用者に時間及び位置情報からよりきめ細かい案内情報を提供できるといふ効果がある。請求項12の発明は、移動局が予め設定された位置にくると、該移動局を発呼して、所定の案内情報を送信する第2の情報提供手段を情報案内センターに設けているので、移動局が立入禁止区域に入るのを警告したり、所定のルートに沿って移動局を導いたりすることが本

＊できるといふ効果がある。

【図面の簡単な説明】

【図1】本実施形態の情報案内システムを示すブロック図である。

【図2】同上の移動局の位置検出方法を説明する説明図である。

【図3】実施形態2の情報案内システムに用いる基地局のブロック図である。

【図4】同上の移動局の位置検出方法を説明する説明図である。

【図5】実施形態3の情報案内システムに用いる基地局のブロック図である。

【図6】実施形態4の情報案内システムに用いるセンターのブロック図である。

【図7】実施形態5の情報案内システムに用いるセンターのブロック図である。

【図8】実施形態6の情報案内システムに用いるセンターのブロック図である。

【図9】実施形態7の情報案内システムに用いるセンターのブロック図である。

【図10】同上の情報案内システムを適用したテーマパークを示す図解構成図である。

【符号の説明】

- 1 移動局
- 2、2' 基地局
- 3 交換機
- 4 情報案内センター
- 6 図像
- 14、24 検出手段
- 15、25 通知手段
- 41 通信手段
- 42 解析処理手段

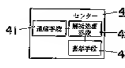
【図3】



【図5】



【図6】



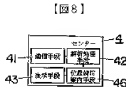
【図7】



【図9】



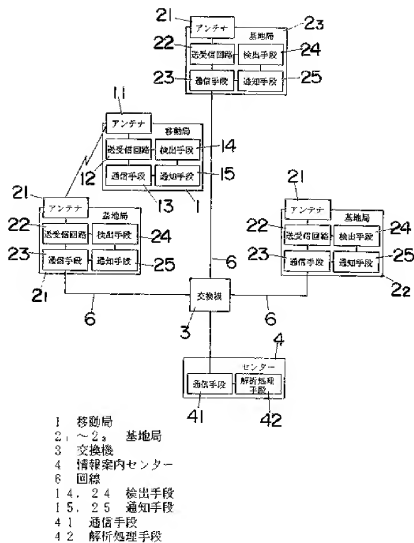
【図8】



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【図1】



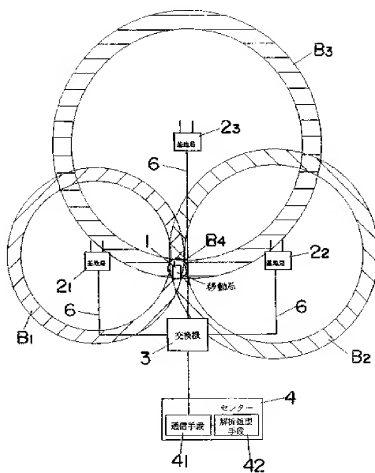




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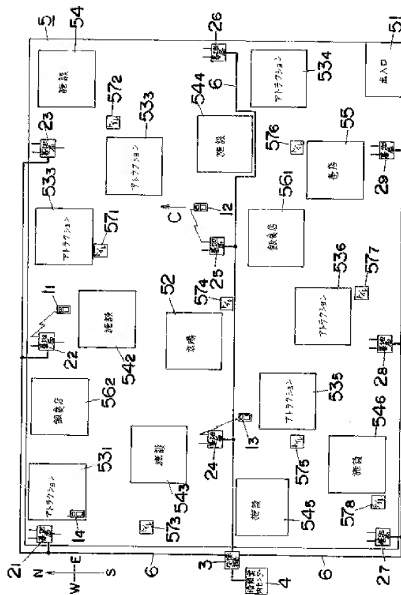
【図4】



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【圖 10】



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